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ABSTRACT

In order for the potential of cable television to be applied for educational benefit, educators must effectively communicate their priorities and needs to both licensing authorities and cable companies. This guide familiarizes educators and school committees with their options and prepares them to take part in local franchise negotiations. It deals with the following questions: How and when will schools and libraries be connected to the cable television system; what provisions will be made for educational channels; what facilities are needed to originate and transmit local programming; can cable television mean cable radio too; and, how can cable systems be interconnected? It then introduces cable basics which can help educators understand the magnitude of building a simple one-way community cable system. The possibility of two-way cable communication is also suggested. Finally, it offers a specific process and format to help the reader personalize the information presented in this guide. Throughout all parts of the book, it is emphasized that a cable system should be designed and operated to fit the particular structure and needs of a local community. Appendixes include: 1) procedural regulations for granting community antenna licenses, Commonwealth of Massachusetts; 2) Massachusetts television markets; 3) institutions in Massachusetts with studio facilities; and 4) potential sources of federal funding for educational technology projects. (CH)

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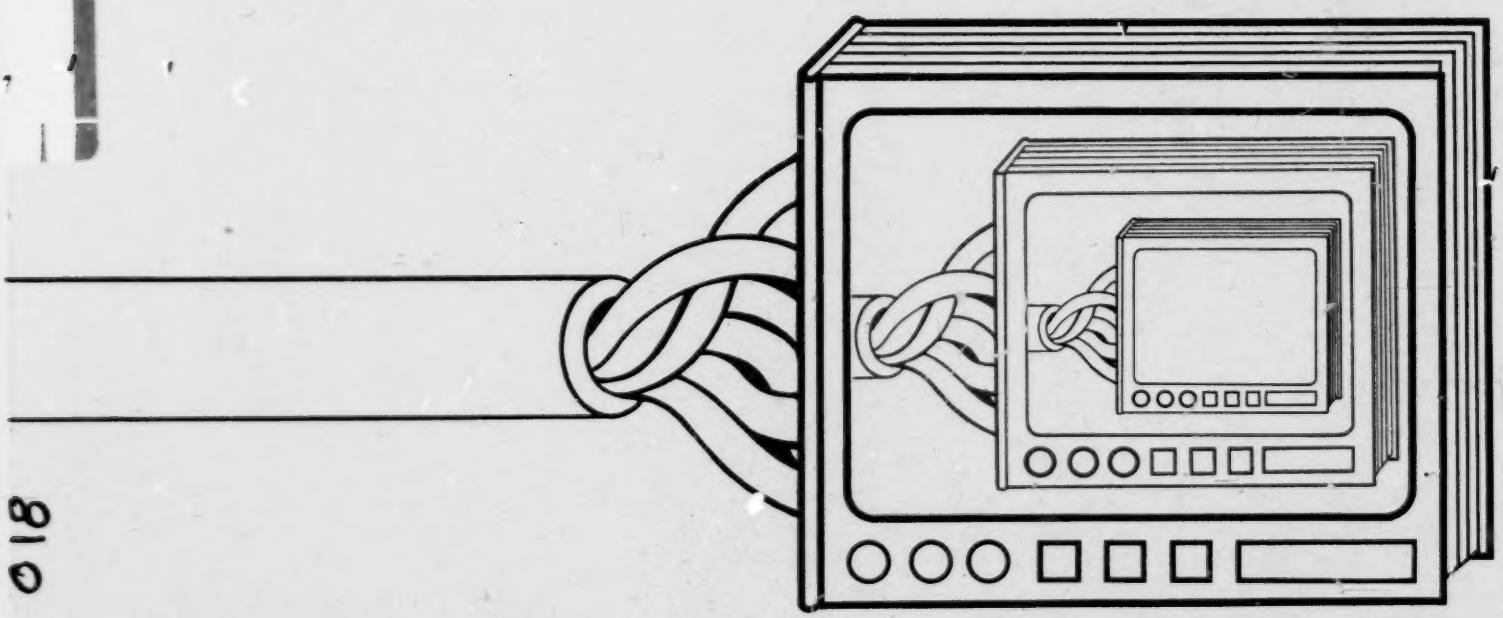
THE HERE, NOW and tomorrow OF CABLE TELEVISION IN EDUCATION

. . . a planning guide



a study for the massachusetts advisory council on education

september 1973

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THE HERE, NOW and tomorrow OF CABLE TELEVISION IN EDUCATION

. . . a planning guide

september 1973

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foreword

Cable television has an immense potential. Its great channel capacity, flexibility of application among various uses and potential for viewer response offer a unique and powerful communications instrument. What this stimulating and instructive planning guide tells us is that if this potential is to be applied for educational benefit, educators must effectively communicate their priorities and needs to both licensing authorities and cable companies.

Cable has difficulties. Its economics draw boundaries around its potential. Its technology must be understood to plan intelligently. Its political problems must be surmounted before full community-wide use can be implemented.

The message of the preceding for educators is clear. Involvement! Without involvement the structure and design of education's role in cable television will be left to chance. Without active participation many of cable's possibilities will be foreclosed and the benefits to many children limited.

To encourage active participation the Massachusetts Advisory Council on Education contracted with Creative Studies Inc. to produce a planning guide to familiarize educators and school committees with their options and prepare them to take part in local cable franchise negotiations. In addition, CSI was to coordinate the production of a film by the Massachusetts Executive Committee for Educational Television (producers of The 21 Inch Classroom) and plan and conduct a series of six regional workshops to heighten the awareness of educators and school committees to what was going on and . . . what was at stake.

Under the able and inspired direction of Ms. Toby H. Levine, Creative Studies has more than met its obligations. Not only has a readable, informative and useful planning guide been published but also a realistic and insightful film ("Cable Television: Wired In or Strung Out") has been produced and thoughtful and imaginative regional workshops have been planned. What has emerged, in short, is an integrated package of materials usable . . . credible . . . relevant to the needs of educational decision makers.

Acknowledgement must be given to Dr. Joseph M. Cronin, Secretary for Educational Affairs, for his cooperation and support in making this project possible. A special note of appreciation goes to Mr. Brian Brightly, Executive Director of the Massachusetts Executive Committee for Educational Television for the resources contributed in producing the film and the Department of Education and its regional coordinators for assisting in the regional workshops. Without this cooperation the project, as conceived, could never have been launched.

One sober closing thought. The project, as good as it is, is only a beginning! Unless intelligent action by local educators follows, this effort will have been in vain. Unless continued support and assistance from responsible statewide agencies is given to localities in meeting and dealing with the problems of cable television, much of what has been started here will be lost. For in the end, as in so many other things in education, it is only the collective power of local-state collaboration and cooperation that can bring about and maintain significant change.

Allan S. Hartman
Associate Director

September 1973

study director's preface

Cities and towns across the nation describe their experiences with cable television in glowing, pessimistic, hopeful, disappointed and confusing terms. This technology, the "cutting edge of the electronics revolution," has expanded educational experiences for thousands of children and adults. For others it has been a great disappointment.

In March 1973 the Massachusetts Community Antenna Television Commission lifted a six-month moratorium on cable licensing and simultaneously issued a new application form and detailed procedural regulations. Both the moratorium and the new regulations were effected in response to the problems and frustrations of the ninety-two communities within the Commonwealth who had previously granted cable franchises. In the great majority of these ninety-two cities and towns, educators had absolutely nothing to say about cable. Many have since said they would not have known what to say had they been asked.

This project was initiated to reverse such situations. Members of the educational community can and should be the most well-informed, active and vocal participants in cable negotiations. The purpose of this planning guide, therefore, is to help them become so in a realistic, pragmatic way.

It is our hope that this guide will be not only a continuing reference tool but an active planning experience.

PART I, THE HERE AND NOW OF CABLE TELEVISION IN EDUCATION, covers cable issues that educators in all communities should be discussing—regardless of whether a franchise has already been signed or it is first being considered.

PART II, CABLE BASICS, is reference material of importance to all community members, but which can particularly help educators understand the magnitude of building a simple, one-way community cable system.

PART III, THE TOMORROW OF CABLE TELEVISION IN EDUCATION, discusses the possibilities and parameters of two-way cable communication. Although many dreams have been voiced that depend on the two-way capability of cable, the reality of cable *today* lies in its ability to transmit in one direction. Two-way cable is an area to watch with interest rather than one on which reliable plans can be made.

Finally, **PART IV, EDUCATIONAL COMMUNITY ASSESSMENT,** is a section we can structure but only you can write. It is the most important part of this guide for it will put into perspective all the issues discussed in Parts I, II and III as they relate to your community. When it is complete, it will constitute a position paper detailing exactly what educators in your community consider essential in a cable system. We urge you to complete it even though it may take some time and research to do so. The long-range advantage of such planning will more than pay for itself.

THE HERE, NOW and tomorrow OF CABLE TELEVISION IN EDUCATION is only one part of this project. The Massachusetts Executive Committee on Educational Television has produced a film titled, **"Cable Television: Wired In or Strung Out,"** which is available on film or on videotape cassette from any of the six regional offices of the Department of Education. In addition, members of The Study Team will conduct **workshops** for School Superintendents and School Committees on cable planning in Fall 1973 at the regional offices.

There are a great number of people whose active support, concern, good sense and hard work contributed to this project. My thanks go to all members of the Study Advisory Commitee for their truly active participation in defining and reviewing all phases of this project. For critically reviewing the final draft of the planning guide, I am indebted to: Mr. Wiliam Carey, Jr., Arlington School Committee; Dr. John Evans, MITRE Corporation, Bedford; Dr. Ronald Fitzgerald, Superintendent of Schools, Amherst; Dr. Estelle Jussim, Professor of Library Science, Simmons College; Mr. Kjell Langaas, Office of the Superintendent of Schools, Oxford, and Mr. Bruce R. Oldershaw, Director, Instructional Media Services, Amherst.

For helping define specific issues, I wish to thank: Wally Briscoe, National Cable Television Association; Argyle W. Bridgett, Director of Engineering, Colony Communications Inc.; Paul Coughlin, Director of Television Operations, Educational Development Center; John Dallas, Audiovisual Coordinator, Wilson Public School, West Lawn, Pennsylvania; Jeffrey Forbes, Executive Director, Massachusetts Community Antenna Television Commission; Stan Gerendasy, Cable Television Information Center, Washington, D.C.; Raymond Goldsmith, Television Engineer, WCVB-TV, Boston; Don Greene of Lake Systems;

Earl Haydt, General Manager, Berks Suburban Cable Company, Reading, Pennsylvania; Neil Hoffman, Hartford Public Schools; and Dr. Robert I. Sperber, Superintendent of Schools, Brookline, Massachusetts.

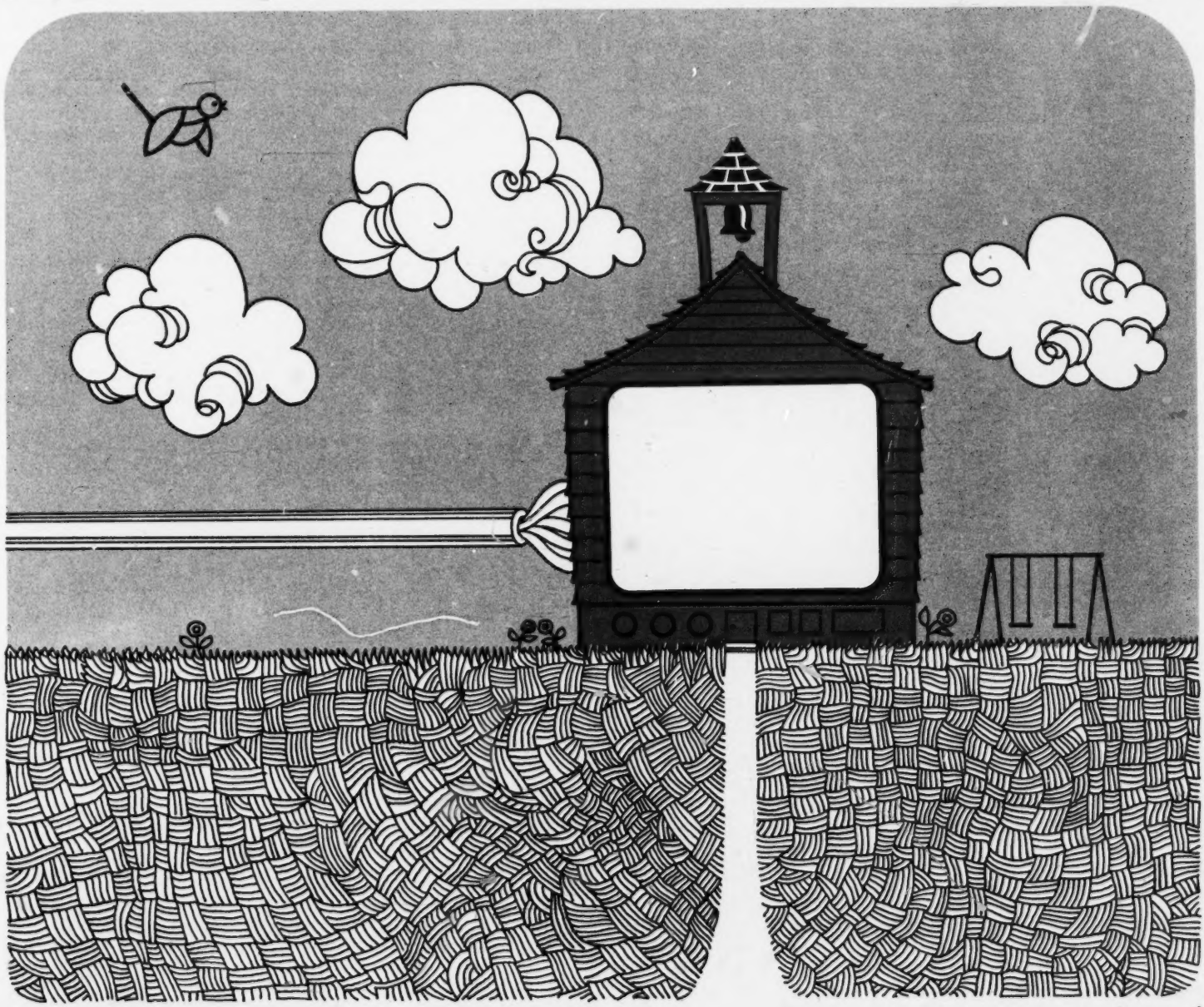
Others whose continued support have been invaluable are: Dr. Allan S. Hartman, Associate Director of the Massachusetts Advisory Council on Education, for his wise guidance throughout; Judith Robbins, Creative Studies Inc. for ably coordinating workshop activities; and Nancy Soulette for having unlimited patience and speedy fingers.

Finally to Andrew, Caren and Amy, my family, I am grateful for their love and understanding and their willingness to do a lot of things for themselves while I was immersed in research and writing.

Toby H. Levine
Study Director

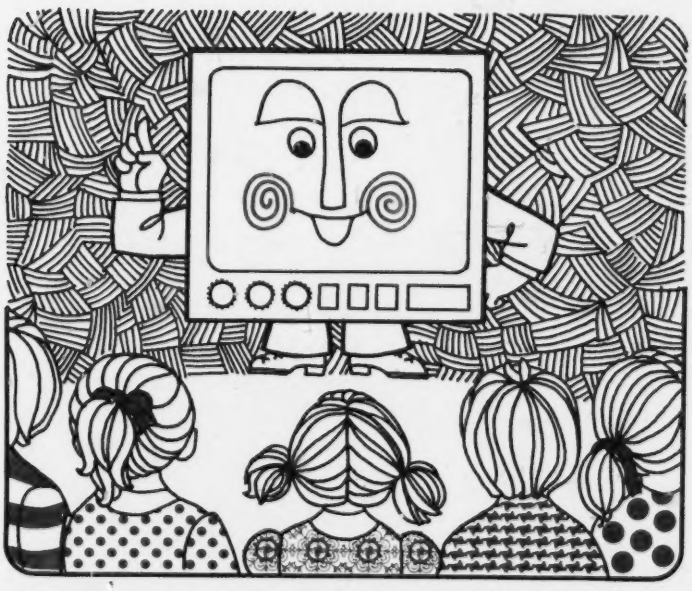
September 1973

PART I/THE HERE AND NOW OF CABLE IN EDUCATION



PART I/CHAPTER I

GETTING STARTED



The rapid growth of telecommunication technology over the past decade has created an aura of mystique around the field of cable television. This growth has often outpaced the abilities of communities to respond appropriately and the mystique has made it difficult, if not impossible, for outsiders to communicate with those who presume to know. Although it is clearly necessary for some segment of a community to assimilate a detailed knowledge of the field, it is just as necessary that a large portion of the community have a basic understanding of the legal, technical and economic considerations and the utilization potential of cable communication if effective community decisions are to be made. This need is particularly acute for educators if schools are to benefit from this new technology.

By 1977, almost all communities in Massachusetts with operating cable systems will be entitled to *"at least one specially designated channel for use by local educational authorities."* School committees and superintendents must understand the implications, and particularly the limitations, of this Federal Communications Commission (FCC) ruling in order for it to be more than a paper promise. In short, they must know the possibilities offered by cable and the ramifications of implementing those possibilities. They must also be able to look to the future to be sure that they have options available as cable technology advances. And, most important, they must be cognizant of the *need to communicate* with the larger community and have the *ability to communicate* and justify the components of a cable system that will fulfill their objectives.

WHAT IS EDUCATIONAL ABOUT CABLE?

There is nothing inherently educational about cable except what you put on it. Whatever promises cable technology may hold for the future, in 1973 a cable system is a means of distributing audiovisual material from a central location to many diverse points. It will not replace teachers, it will not improve reading scores, it will not save money. It will not change anything unless it is used to distribute material that is educationally sound and interesting to look at. The success of any new communication technology depends on the value of the material which is used with it.

The discouraging aspect of discussing educational uses of cable is that you must first have a cable system before you can use it. This does not preclude, however, the absolute necessity of considering programming policies simultaneously with franchise issues. One without the other is meaningless.

Before reading further you should know that:

- **This guide has been prepared specifically for those educators who will take an active role in local cable planning and local cable advisory committees.** It reflects the experiences and specific regulations of the Commonwealth of Massachusetts but can offer guidelines for educators elsewhere if their states' regulations are taken into consideration.
- **Every community is different. Every school system is different.** Not every community will find cable desirable, nor can every community support a cable system.
- **Cable is a local phenomenon.** Cable licenses may only be granted by a *bona fide* Issuing Authority, defined as "the City Manager of a city having a plan D or E charter, the Mayor of any other city, or the Board of Selectmen of a town."
- **Cable is, therefore, a local political phenomenon.** Educators must approach cable franchise issues with the stark realization that they can influence what happens, but final decisions will be made by the local Issuing Authority.

- **Cable channels will require programming**. Politics, therefore, do not end when a franchise is issued nor when the entire system is built. To make effective use of cable facilities, educators will have to convince students, teachers, parents, school committees, library boards of trustees and budget committees to support programming plans.

- **Cable is a business**. People are willing to invest capital to start a cable system because they expect to make a profit. Schools are not considered potential subscribers and therefore they offer the system no direct revenues. Granting a license to a private, profit-making organization, however, is not the only way to get a cable system built and operating. Educators should examine carefully alternative patterns of ownership, e.g., municipal ownership, the creation of a non-profit organization etc., to determine what financial arrangements might ultimately be most beneficial.

- **Cable licenses are negotiated.** As in any negotiation, the better prepared individual participants are, the more alternative possibilities they have considered, the more likely they are to reach an equitable agreement. Each community should prepare a document specifying its cable needs. Potential system owners can then respond with specific proposals to meet those needs.

- **There is no such thing as a model franchise**, although minimum standards are determined by law. As each community differs, so will its cable system.

CABLE REGULATIONS

Cable is regulated within the Commonwealth by the Massachusetts Community Antenna Television Commission, a seven-member panel brought into existence in 1971 by Chapter 166A of the General Laws. In March 1973, following a six-month moratorium on licensing, the Commission issued a standard license application form and detailed procedural regulations spelling out just what steps a community must take before issuing a franchise (see Appendix I). The most important of these for educators is that the Issuing Authority must establish a Cable Advisory Committee whose membership reflects *"adequately the social, political, **educational,** cultural and economic makeup of the community."*

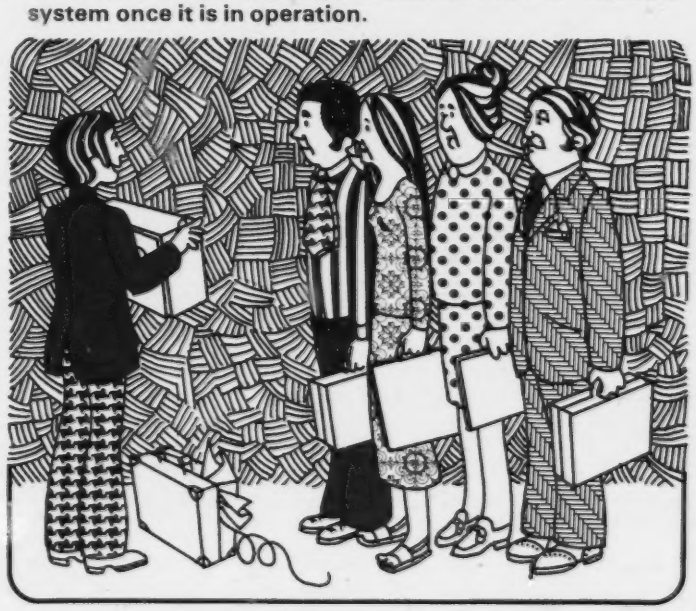
Cable is further regulated by the Federal Communications Commission (FCC) which must issue a certificate of compliance with its rules before a cable system can operate.

WHO REPRESENTS EDUCATION?

Both State and Federal regulations (which speak of the *"local educational authority"*) leave the specific answer to this question to each locality. In some communities it will be relatively easy to define. But in most cases the educational community will be a mix of public and private schools, local and regional schools, local and regional public library systems, elementary, junior high, middle and high schools, junior colleges, colleges, universities, specialized municipal and state information services and continuing education facilities. Each of these groups may have something to offer a cable system and something to gain from it.

The National Education Association and the Massachusetts Teachers Association have urged that franchises include the establishment of an educational advisory board with representatives of the local education association and other appropriate groups to oversee full and fair use of cable facilities. It is recommended that such a group be formed prior to the issuance of a franchise, if possible, to serve the following functions:

- **to prepare a position paper detailing essential educational specifications of a cable license;**
- **to recommend a representative to the Issuing Authority's Advisory Committee who will present, defend and negotiate for the positions taken therein; and**
- **to determine how educational interests can best share a system once it is in operation.**



PART I/CHAPTER 2

EDUCATORS AND CABLE PLANNING

Although the specifications for a community cable television system can easily run to several hundred pages, there are certain basic questions that are of specific importance to educators and that should be considered by the educational advisory board:

- **HOW AND WHEN WILL SCHOOLS AND LIBRARIES BE CONNECTED TO THE SYSTEM?**
- **WHAT PROVISIONS WILL BE MADE FOR EDUCATIONAL CHANNELS?**
- **WHAT FACILITIES ARE NEEDED TO ORIGINATE AND TRANSMIT LOCAL PROGRAMMING?**
- **CAN CABLE TELEVISION MEAN CABLE RADIO TOO?**
- **HOW CAN CABLE SYSTEMS BE INTERCONNECTED?**

These questions provide the basis for this chapter. As you proceed through the chapter you will find yourself immersed in successively greater uses of cable systems. Each level implies the inclusion of the one before it and requires certain additions to a basic community cable distribution system. Many of these additions are beyond the realm of what you can expect any cable owner to include in a franchise. You will, therefore, need to consider where money for these items can come from. Although approximate costs are included in the discussion, they are intended to suggest an order of magnitude, not a specific price.

This chapter is important even if your community has already granted a cable license. Licenses granted prior to 1972, whether systems have been built or not, are known as *"grandfathered"* because they came into being prior to the regulations put into effect by the Federal Communications Commission in 1972. They have until March 31, 1977 to comply with certain FCC regulations, defined below. Further, if the owner of a *"grandfathered"* system has not complied with the terms of the original contract, you may request a hearing from the Massachusetts Community Antenna Television Commission (see Bibliography and Sections 10 and 14 of Chapter 166A for specific review powers of the Commission).

question 1
How and when will schools and libraries get connected to the cable system?

- **STATE AND FEDERAL REGULATIONS**
- **LIMITATIONS OF REGULATIONS**
- **TECHNOLOGY AND ECONOMICS OF INTERNAL WIRING**
- **FUNDING INTERNAL WIRING**
- **ADAPTABILITY OF EXISTING TELEVISION SYSTEMS**

STATE AND FEDERAL REGULATIONS

State regulations require that an applicant agree to provide *"a cable drop and an outlet along its cable routes at no cost to public schools, police and fire stations, public libraries and other public buildings designated in writing by the Issuing Authority."*

The FCC requires a cable system *"to accomplish significant construction (wiring) within one year after the certificate of compliance is issued and that thereafter, energized trunk cable be extended to a substantial percentage of the franchise area each year, the percentage to be determined by the franchising authority."* The FCC has suggested that twenty percent is a reasonable annual rate of wiring, but it is the responsibility of the Issuing Authority to determine when areas will be wired and, equally important, the precise geographical distribution of the wiring.

LIMITATIONS OF REGULATIONS

In order to understand the serious limitations of these regulations we shall combine and restate them: If a public school is along the cable operator's established route, the cable operator must provide service to the school so that cable programming can be received in a single location. Let us now dissect this statement further to show what it really means and what influence the Issuing Authority may have.

- Not all schools in a community will necessarily be public. Neither will all educational buildings necessarily be schools.
- Even public schools may not be part of the cable operator's established route. Because of their need for cash flow, cable operators will want *first* to wire those areas which are likely to be the most profitable — where the population is most dense, most in need of improved broadcast reception, most able to afford cable service and nearest the head end. These factors may bear no relationship to the location of schools.
- The amount of wiring that a cable operator must provide to designated schools is minimal and relatively useless if extensive use of educational programming is anticipated. An analogy can be made to the services of the electric utility: wiring is provided to the house; internal wiring is the responsibility of the owner. To extend the analogy further, the cable operator is only required to provide the equivalent of one light bulb in your front hall. You may have some say over where the front hall is, but the second floor will remain dark.

In view of the above, it would be prudent for local Issuing Authorities to insist that any franchise agreement specify that all public and private schools and public libraries be connected to the cable system free of charge regardless of their location. The franchise should also clearly state that this condition extends to any schools or libraries which may be constructed during the period of the license. Further, the Issuing Authority should determine by what date all designated buildings should be reached. This may be stated as a specific date (e.g., within the first year), as a relative date (e.g., before the first subscriber is billed), as a measure of subscriber growth (e.g., when subscriber participation reaches thirty percent) etc.

TECHNOLOGY AND ECONOMICS OF INTERNAL WIRING

If, in fact, the cable operator is not required or is unwilling to wire schools completely, the schools will have to do so for themselves. A detailed discussion of cable technology can be found in Chapter 4. Briefly, however, to be connected to a cable system:

- **each viewing location must have a cable outlet;**
- **each cable outlet must be connected to the cable drop** (the cable that connects each building to the wiring along the street);
- **in cable systems with more than twelve channels, each television set must have a channel converter or A/B switch.**

The drop provided by the cable operator should be sufficient to serve at least two viewing locations without an amplifier, if the locations are not far from the drop. For more extensive cable service, i.e., many viewing locations, each building will require additional internal wiring.

A convenient rule of thumb cost index for internal wiring is $40-$100 *per outlet*, derived by dividing the total cost by the number of outlets served. For example, assuming that 2,000 feet of cable are necessary to wire a forty-room school, and that one distribution amplifier is adequate to maintain the signal, the costs can be estimated as follows:

Cable 2,000 ft. @ $.05/ft.	$ 100
Amplifier @$200/each	200
Outlets 40 @$10/each	400
Installation 2,000 ft. @$1/ft.	2,000
Converters @35-$50/each	1,400
	$4,100

Total Cost/Number of Outlets=Cost per Outlet $4,100/40 = $102.50

This example assumes the existence of forty television monitors ($250-$500 apiece). If the system has no more than twelve channels, the cost of converters can be eliminated entirely. The costs can be reduced further if fewer monitors exist, as fewer converters will be necessary and possibly fewer outlets will be needed.

Theoretically, the system described above would be able to receive up to thirty channels of a cable system's offerings and would be able to originate signals from any one of the outlets themselves. The ability to do the latter would depend principally on the type of outlets installed. Inexpensive outlets generally have only receiving capability, a fact which planners should consider when defining specifications for new schools. Outlets in the upper range should make every room capable of being a studio.

Obviously, the most ideal situation for the greatest cable utilization is to have viewing capability in every room of every school. In that way even a single television set can be used anywhere.

FUNDING INTERNAL WIRING

How much wiring a cable operator will provide will depend on a variety of factors, not the least of which are the potential economic viability of the system (see Chapter 5) and whether or not schools have existing studio facilities that the cable system might use.

The cable operator may be asked to provide additional internal wiring but it should be noted that the FCC will only allow between three and five percent of gross subscriber revenues to be returned to the Issuing Authority as a franchise fee. The cable operator might maintain that the cost of internal wiring should be considered part of that fee.

In many cases the cable operator has agreed to provide additional wiring for the cost of parts and labor; or, a private contractor can be hired.

The Massachusetts School Building Assistance Program provides between fifty percent and sixty-five percent reimbursement funds to communities that embark on approved school building and renovation programs. Although it is unlikely that programs would be approved whose only purpose is rewiring for television, plans for such should be included in major renovation or construction programs.

ADAPTABILITY OF EXISTING TELEVISION SYSTEMS

Schools may already be partially wired for cable television through a Master Antenna, Closed Circuit or Instructional Television Fixed Service system. In each case, schools will have to consider whether such systems completely meet their needs or whether additional expense is justified to hook-up to a community cable system.

A *Master Antenna Television System* is simply a means of improving reception of broadcast channels where several television sets may be used simultaneously and where individual antennas are undesirable. It is similar to a cable system but simpler and only involves a single building. Whether an MATV system and a cable drop will be compatible depends largely on the age of the MATV equipment. New systems are generally being installed with cable in mind. In older systems, the MATV amplifier probably will not be able to handle the twenty or more channels of a new cable system and will have to be replaced. In addition, if the new system has more than twelve channels, a converter or A/B switch must be attached to each TV set if cable channels are to be received. A competent technician should test the adequacy of all portions of the system.

A *Closed Circuit Television System* is basically a small cable system which may involve one or several buildings. It is capable of originating programming but does not normally carry broadcast signals. Hook-up with the community cable system would allow it to do both and to have its original programming seen by the community at large. Again, its compatibility with a larger system depends on its age, and specific systems should be professionally checked.

Instructional Television Fixed Service (ITFS) was established by the FCC in 1963 to provide multiple frequencies for inter-school educational television use. Requirements for eligibility to be a licensee of an ITFS station are the same as those for a noncommercial educational television station, i.e., far more stringent than for cable. Although it is not a broadcast service, a single ITFS system can provide up to four simultaneous channels for in-school service, plus systems to permit two-way communications.

ITFS transmitting equipment operates with very low power, with a useful service range of about twenty miles, but differs technically from standard VHF and UHF broadcasting and is much lower in cost than television broadcast equipment.

question 2
What provisions will be made for educational channels?

- EDUCATIONAL BROADCAST vs. EDUCATIONAL ACCESS
- FEDERAL REGULATIONS
- LIMITATIONS OF REGULATIONS
- LEASING CHANNELS
- HOW MANY CHANNELS DO YOU NEED?

EDUCATIONAL BROADCAST vs. EDUCATIONAL ACCESS

When schools and libraries are wired for television and hooked-up to the community cable, the next task is insuring that there are channels or channel time dedicated to education. Two types of channels offer potential educational programming: the first is noncommercial educational broadcast television stations; the second is public access channels. Public access channels do not distribute broadcast signals; they are programmed and controlled by the local community. There are three types of access channels — public, local government and educational. A number of federal regulations control their inclusion in a cable system and their use. These will be defined below.

In Massachusetts, noncommercial educational stations are WGBH (Channel 2/Boston), WGBX (Channel 44/Boston) and WGBY (Channel 57/Springfield). WGBH and WGBY are of particular importance since it is over these channels that The 21 Inch Classroom programs are shown. The programs are selected and/or produced by the Massachusetts Executive Committee for Educational Television (MECET), the media services bureau of the Department of Education. Over forty instructional series are offered for grades K-12 in a variety of subject areas. Several series include teacher training programs as well.

Cable should enable every community within the Commonwealth to receive either WGBH or WGBY, or both. This should be specified in any franchise contract where it is not required by the FCC.

FEDERAL REGULATIONS

Total Number of Access Channels

The FCC requires that each new cable system (after 3/31/72) have at least *twenty* TV channels available for immediate or potential use. For every channel used to carry broadcast signals, one channel must be dedicated for other uses. Thus, on a twenty-channel system, ten channels could be used for broadcast signals; ten for public access, local government access, educational access and local origination. The difference between these types of channels is in responsibility and control of programming. The cable operator is responsible for and has control of programming on local origination channels. Federal regulations prohibit the cable system from any control of public, local government or educational access channels, except to insure they conform to rules prohibiting advertising, lotteries and obscenities.

Dedicated Educational Access Channels

In new systems (after 3/31/72) in the top-100 television markets (see Appendix 2), FCC regulations require that there be at least one channel for use by local educational authorities. The use of this channel must be provided free for the first five years.

Cable systems which began operation before March 31, 1972 do not have to comply with access channel rules until March 31, 1977. But:

- If a grandfathered system (one operating before the deadline) does provide an educational channel before 1977, the cable operator must make it available without control of program content and without charge for a five-year period.

- If a grandfathered system receives a certificate of compliance from the FCC to carry additional broadcast television signals before March 31, 1977, it must offer at least one of the required access channels (public, educational or local government) for each new broadcast signal.

The FCC also requires that additional access channels be made available as needs arise. Whenever all the non-broadcast channels are in use eighty percent of the time during any consecutive three-hour period for six consecutive weeks, the system must add an additional non-broadcast channel within six months.

LIMITATIONS OF REGULATIONS

Note that not every cable system has or will have an educational access channel. First, the community must be in a top-100 market (see Appendix 2) for the regulations to apply. Second, the regulations may not apply until 1977. In many cases there is only one public access channel which is shared by educators with other community interest groups.

As this is the first opportunity for educators to create and distribute local educational programming, it would be wise for the

local Issuing Authority to insist upon at least one educational access channel as a condition of a franchise. In 1973, Representative Nolen of Ware introduced House Bill 5299 which, if enacted, would have amended Chapter 166A of the General Laws to include the provision of two educational access channels — one for the use of elementary and secondary schools and another for colleges and universities — as a franchise specification. Although this bill was defeated in 1973, it is to be reintroduced in 1974.

Neither federal nor state regulations offer any guidelines on how "educational authorities" might use or share an access channel. It may be necessary to decide what is strictly educational and what educational communications may be considered local government issues. These are policy questions which can be decided only by educators sitting down with local municipal officials and mutually defining their needs. For example, in the early days of a cable system's operation, schools might use their channel only during school hours and agree to grant the evening hours to some other group. Or, in a reverse situation, if schools considered broadcasting adult education classes in the evening, they might request time on the local government channel to broadcast school committee meetings. Such arrangements will be particularly necessary for systems outside the top-100 markets or "grandfathered" systems where one access channel may, in fact, have to be shared, at least until 1977.

A final note on the limitations of these rulings relates to the free nature of the channel. The only thing that is free is the use of the channel. **Programming will cost money.** The time period of five years should be specified as five years from the time the final section of cable is energized and all designated public buildings are connected, rather than five years from the date of franchise signing. The FCC considers this five-year period one of experimentation in all forms of public access. There is no way of knowing at this time whether the ruling will be extended, curtailed or eliminated after evaluation.

The National Education Association and the Massachusetts Teachers Association have recommended that all cable franchises include a minimum of one free educational channel for the length of the franchise and a minimum of twenty percent of additional channel capacity for educational, governmental and public access use without charge. They based this recommendation on the historical growth of radio and television where the precedent of reserving twenty percent of the channels for education was set.

LEASING CHANNELS

Whether cable operators will, in fact, grant the free use of more than the minimum required channel is dubious. The cable system will, however, undoubtedly have the capacity for channels that are not immediately activated. Some of these may be activated by the guaranteed system expansion ruling; others may be leased.

Every channel costs something to activate. There are capital and operating costs plus consideration of how much an hour's channel time is worth. It has been suggested that the actual cost of activating a signal may run in the vicinity of $1,000-$2,000 per channel. This does not take into account any use cost. But the industry has had little experience in leasing channels either locally or nationally, so there are no guidelines to follow. One industry proposal included a provision to lease channels at $1 per year to minority groups, but the FCC has taken issue on the grounds of discriminatory pricing practices. On the one hand, the lack of commercial considerations may simplify the leasing question for education; on the other, if additional channels are given or leased at a low rate to educators, the cable operator loses the potential of advertising or commercial leasing revenue from those channels.

HOW MANY CHANNELS DO YOU NEED?

The cable dream of bringing a community together and expanding educational opportunities beyond the walls of a classroom lies in two capabilities peculiar to cable. One is its two-way capability, the other is the almost infinite number of channels it can simultaneously transmit. The greater the number of channels available, the more specific and personalized educational services can become. Like the question of whether to wire every room in every school, this question relates to future capability rather than to immediate utilization. Although there are specific costs associated with activating a channel, the cost for laying a new cable to create additional channels is very expensive, for it is almost like starting from scratch. Is a twenty-channel system (the current minimum requirement), therefore, sufficient?

The technology theoretically exists for systems with ninety channels, although it may prove difficult to activate all of these successfully. It is certainly not currently practical to program that many channels.

Whether your community requires a system larger than twenty channels depends on what plans you have for non-broadcast channels. Assuming that there would be ten non-broadcast channels available in a twenty-channel system, a sample plan might be:

- 1 public access
- 1 local government access
- 2 educational access (1 elementary/secondary; 1 college/university)
- 1 automatic local origination (news, weather, time checks etc.)
- 1 syndicated local origination (programming bought by the cable operator for cablecasting)

Only four channels would then remain for expansion of public access, additional local origination and/or leasing.

If, ultimately, you wished to dedicate one channel each to elementary, secondary, college and adult education, clearly twenty channels are not sufficient.

It will be far easier to expand use if channel capacity is already available. If a community consists of many educational interest groups, a thirty-channel capacity system may be more appropriate.

question 3
What facilities are needed to originate and transmit local programming?

- **FEDERAL REGULATIONS**
- **DISCUSSION**
- **CONNECTING STUDIOS TO THE HEAD END**

FEDERAL REGULATIONS

Cable systems in top-100 markets that began operation on or after March 31, 1972 must have studio facilities.

DISCUSSION

Studio facilities are the backbone of local programming — educational or otherwise. Studio sophistication ranges from the simplicity of a single videocassette player and recorder costing about $1,400 to full-scale color broadcast facilities costing half a million dollars. Quite adequate local studios can be equipped with black and white equipment for under $25,000. Depending on the equipment available you may only be able to cablecast material produced by other agencies or you can produce a full-scale instructional series.

Many cable owners have found it in their own best interest to build and equip studios, even if they are not required to do so. The industry generally feels that any specifically local service they can provide will increase the number of subscribers. Having invested in studios, cable owners may be willing to provide training programs for students and school personnel.

It should be noted, however, that the system's studio may neither be adequate, geographically convenient nor sufficiently available for educational needs. Further, cable owners may not make agreements which would tie up studio facilities for any length of time and thus prevent the public from being informed about *"controversial issues of public importance."*

School systems and communities in general will vary widely in their ability to support major production facilities. (See Appendix 3 for a list of studio facilities currently existing in the Commonwealth.)

Where school studio facilities exist prior to a cable system, it is not uncommon for the cable operator to use them in return for some other asset — perhaps internal wiring?

Although it might ultimately be desirable for every school building to have a studio, it is unreasonable to plan that way initially. It is instructive to note that one commercial television station in Boston has a single studio and produces approximately twenty-five hours of programming per week, although fifteen hours per week of locally produced commercial programming is more usual.

In developing studio facilities, schools and cable operators should plan capability for (1) cablecasting existing audiovisual material, (2) mobile production and (3) studio production.

Virtually all local production at this time will be done on videotape, not film. Also, most pre-recorded material available for cablecasting will be offered on videotape. Production facilities, therefore, can be planned for videotaping, not necessarily filming, but the important addition of a set of machines known as a film chain, either in the cable or school studio, will allow material produced on film or slides to be sent out over the cable.

Videotape is sold in different widths (¼", ½", ¾", 1" and 2"), each larger width producing an appreciably better quality picture, in black and white or color, and in various formats (reel-to-reel, cartridge and cassette). Most local production has been on ½" black and white tape because it has been the most economical, easiest to handle and compatible portable equipment existed. Currently, many facilities are switching to ¾" tape because it is comparable in price and now has good quality compatible playback equipment as well as color capability. However, ¾" tape is only available on cassette (which is extremely difficult to edit) and compatible portable equipment is not yet standard.

Obviously, some combination of equipment is necessary if a full range of production is considered. Prices noted for any equipment that follows are guidelines, not quotations.

Option A: Cablecasting Existing Audiovisual Material
To cablecast existing audiovisual material — including black and white or color film, slides, filmstrips and ¾" videotape cassettes — you will need:

1 film chain (color)	$15,000 and up
1 ¾" color videotape recorder	$1,525

Note that the Massachusetts Executive Committee for Educational Television has established ¾" videocassettes as its standard distribution format.

Option B: Mobile Production of Unedited Original Material
To produce original material of a simple documentary nature outside a studio you will need:

1 portable, battery-operated, black and white video camera and a ½" videotape player/recorder	$1,500

This is commonly known as a Portapak (although that is SONY's tradename). The package includes a camera, battery-operated recorder/player, hand-held microphone etc. Half-inch tape costs about $30 an hour.

Option C: Studio Production of Edited Original Material, Black and White
To equip a fairly simple studio capable of producing programs on black and white ½" videotape, consider:

2 black and white cameras @ $2,000/each	$4,000
2 ½" editing/recording decks @ $1,400/each	2,800
6 microphones @ $50/each	300
2 portable lighting kits @ $500/each	1,000
3 9" monitors @ $260/each	780
1 special effects generator	1,000
2 RF units @ $65/each	130
1 audio mixer	125
1 processing amplifier	3,500
miscellaneous cable and console	250
	$13,885

Option D: Studio Production of Edited Full Color Material on 1" Videotape
A full color studio would require at least:

2 color cameras @ $10,000-$15,000/each	$25,000
1 1" recording/editing deck	10,000
2 color monitors	1,000
1 switcher	2,500
1 sync generator	3,800
accessories	3,000
console	750
	$46,050

Additional equipment might be:

1 multiplexer	$4,000
distribution amplifiers	4,600
oscilloscopes	4,000
film projector	3,000
slide projector	1,000

Tradeoffs
The problem with so many different-sized formats is that equipment is reasonably compatible within a size but not between them. Thus, if you plan (1) to use portable ½" equipment for mobile production, (2) to buy prepared ¾" videotape cassettes and (3) to produce programs in the studio on 1" reel-to-reel color tape (a not unreasonable plan), you would need playback equipment for each format. This is further complicated by some sizes existing only on cassette, others only on reel-to-reel. Playback machines must be compatible with this factor as well.

The "quality" of programming produced in different kinds of studios is a subjective question, except insofar as it refers to the signal received by subscribers. The half-inch package will allow most of the people on a cable system to receive good quality black and white pictures most of the time. The one-inch package will allow almost all of the subscribers to receive a high quality color picture almost all of the time.

Installation and Maintenance Costs
As equipment becomes more sophisticated, it will cost more to install. Depending on its use, environment and personnel experience, lifetime maintenance on ½" equipment will run from zero to one-third of capital costs. If the equipment remains studio-based, it will last about five years; if it is moved around a lot, three years is probably more realistic.

The one-inch package should have a longer life, though maintenance costs will again vary with treatment. Allow no less than ten percent of capital costs per year for maintaining it.

CONNECTING STUDIOS TO THE HEAD END

A studio by itself is useless, except for playback at the site or through existing closed circuit systems, unless it is connected to the head end of the cable system which transmits all programming. This can be done by cable if the distance is short, by microwave relays, by ITFS, or by some messenger taking the tape to the head end (commonly called bicycling). In the case of live, non-studio coverage, a portable microwave relay can be used.

In a more sophisticated system, with two-way audio and video capability, the programming could be sent to the head end on a return channel. This use of technology is far in the future for most systems, however.

The costs of connecting each studio to the head end by cable (see Chapter 5) would follow basically the same pattern as laying the original cable. The costs of portable and stationary microwave relays are not yet standard. Estimates should be obtained based on specific needs. One western Massachusetts school district expended $15,000 to connect its junior high school studio to the head end of the local cable system.

question 4

Can schools use cable radio?

- A POSSIBLE OPTION
- FEDERAL REGULATIONS
- TECHNICAL AND ECONOMIC CONSIDERATIONS
- PROGRAMMING CONSIDERATIONS

A POSSIBLE OPTION

The enormous bandwidth associated with cable technology includes the entire FM bandwidth. Although it is rarely discussed, this capability seems to offer exciting prospects for cable radio in general and educational radio in particular. The activation of the FM bandwidth may be economically beneficial to the system owner since it opens up many new channels for leasing, and, since audio channels are much easier and cheaper to program locally, this leasing potential may, in fact, be higher for audio than for video channels.

Audio-only capability could be particularly attractive to schools which have wanted their own radio stations but have been deterred by the intricacies of obtaining an FCC license.

FEDERAL REGULATIONS

The FCC has not reached a final decision on which radio broadcast signals can be carried. Currently, in cable communities with less than 50,000 population, no radio station located outside a radius of 75 miles from the cable community may be carried if there is already a licensed radio station within that radius. In addition, no radio signal can be brought into any community where the cable system does not carry all AM and FM stations licensed to the community.

The regulations do not mention local access channels. It is highly unlikely, however, that broadcast stations would fill up the entire channel capacity in any single community.

TECHNICAL AND ECONOMIC CONSIDERATIONS

- To originate radio programming, a standard, low-power FM studio set-up and/or commercially available high-fi equipment will be necessary. To originate live radio outside a studio setting may cost only one-sixth as much as live video pickup.
- To distribute programming the cable system will need a good quality FM modulator (which costs about $1,000) so that a proper level signal can be maintained that does not interfere with adjacent signals.
- Although an audio-only program can be fed on a video channel and received on a standard TV set, this wastes an entire video channel and is not economically sound. Operators have provided direct drops to FM radio sets of home subscribers and most operators have not charged from them, although it is an incremental cost. Standard rates are likely to be set up in the future.

PROGRAMMING CONSIDERATIONS

The current generation of students has been educated in a highly visual culture. Television has dominated most of their lives since birth. Cable radio can provide the means of disseminating an extensive variety of aural programming, including bilingual material.

In addition, radio transmission is easily combined with telephone lines for two-way communication. The talk show format, widely used on commercial radio and television, can be adapted to educational needs to provide forums between students and teachers, parents and teachers etc.

question 5
What is interconnection?

- WITHIN A COMMUNITY
- BEYOND A COMMUNITY

WITHIN A COMMUNITY

Interconnection can take a number of forms. In general, interconnection means that two things — in this case, two schools — are connected to each other. Where schools have drops from the residential cable system, each school is connected to every other school on the cable through the head end — as is every residential subscriber in the system. Whatever signals are fed through the head end are sent to everybody on the cable. Thus, should School A send a program through the system's head end, the program will be sent out to all cable receivers, including School B's.

Can School A originate programming that will be sent out *only* to schools and not to other subscribers? A program will always be transmitted first to the head end. There it will be placed on a frequency and transmitted to all subscribers. But, the signal can be sent out scrambled, to be unscrambled by converters at local receivers. This situation pertains commercially to pay TV where activating the unscrambling device alerts the cable system to bill a customer for a particular program. A far more economical system, however, is to assign a particular channel or channels to educators and adapt converters so that only designated converters include those channels. This creates, in effect, a private educational channel.

An alternative answer to this question relies on basic cable technology. Every system needs an antenna and a head end. Schools might consider building their own mini-cable system (in effect, a closed circuit system). This way they could be connected to the main municipal system and receive all programming from it, but their own programming would be fed only to their audience from their own head end. Laying a separate cable network to all schools is subject to the same economic laws as a residential system, except that schools become the entire subscriber base.

BEYOND A COMMUNITY

The real question about interconnection is probably not how to limit the system but how to expand the system. Suppose there is a university in a nearby community handling educational programming in that locality. It may make sense for the two communities to be connected, particularly where separate communities would not alone be able to afford innovative programming. Sharing the cost among two or more regions can be beneficial both economically and educationally.

Interconnection of cable systems to provide a variety of networks for program distribution is feasible, both regionally and nationally. The latter was recently demonstrated at the annual meeting of the National Cable Television Association. Regional or statewide interconnection would allow a program of common interest to be carried to all subscribers in the various local systems. The technique of interconnection relies on the basic technology of a cable distribution system (see Chapter 4). Two small, adjacent communities may share a head end, in which case all programming would be the same. Or, adjacent communities may share a studio facility if that facility is connected to each head end.

Some head ends (within close proximity) can be interconnected through microwave, cable relay systems or ITFS but for greater distances domestic communications satellites may be the answer.

PART I/CHAPTER 3

THE HERE AND NOW OF CABLE PROGRAMMING

For the purpose of discussion we will assume that you anticipate successfully weathering the negotiation process. One way or another you have been assured of having some dedicated educational time available on a local access channel, a sufficient number of television receivers on which to view it, a cable system capable of local origination and some production equipment. Obviously, that is only one-half of the equation. Without quality programming, your negotiation efforts will have been in vain.

Planning for cable programming, therefore, must begin immediately. But it should be accomplished slowly and carefully, for unless you already have a wired town and wired schools, you have a few years before an empty channel will stare at you. You can assume that franchise negotiations will take from a few months to a few years. Then the FCC must issue a certificate of compliance with federal regulations. There is no way to estimate how long this will take. Finally the system must be built, which can take from one to five years. Consider this time a gift for it will allow you to prepare, plan and evaluate without pressure.

WHAT CAN BE PUT ON CABLE?

Basically there are two options: You can buy audiovisual material that has been produced elsewhere or you can produce your own. In designing a program schedule these should not be considered mutually exclusive but rather evaluated on their own merits to achieve specific goals. Each option has advantages and drawbacks. Each requires different investments in time, money and personnel. Each can fulfill different objectives.

Cablecasting Existing Audiovisual Material

What material can or cannot be legally duplicated and/or cablecast is an issue that is clouded with confusion and in serious debate all over the world. The United States Copyright Act was enacted in 1909, long before the technology existed for producing sound films, let alone for duplicating them fairly easily and inexpensively on videotape. This law is now being reviewed and revisions are being considered, but it is difficult to predict when or how the key issues will be resolved. In general, *the present copyright laws preclude duplication of copyrighted materials without permission from the copyright holder.* Many educators are taking their chances in the hopes that the revised copyright laws will include educational exemptions or that they can claim that violations were perpetrated innocently.

The decision on whether or not to cablecast commercially produced educational films, film strips, slides etc., will depend in part on how many classrooms will want to view the same material simultaneously and in part on whether the access channel is prescheduled by a centralized body or on a "by request" system from teachers in the schools. It also depends, of course, on how adequate your current media distribution system is. It would be economically impractical to use an entire channel for a film that only one class wants to see, unless the channel would not otherwise be used.

It is recommended that schools begin now to review their media libraries and to negotiate with publishers and producers for the right to cablecast for educational purposes material that is already owned. This right will not be granted without paying some sort of fee. Different publishers and producers are likely to negotiate in different ways, some assessing a one-time per-pupil fee, some

using a per-showing charge etc. Many film producers are now making their material available on ¾" videotape cassettes. But these cassettes are intended for viewing in individual classrooms on videocassette players. Broadcast or closed circuit use is generally excluded by the terms of the sales agreement. In negotiating new purchase agreements you should include a specific provision that material purchased may be cablecast.

We will assume that all wired communities in Massachusetts will receive either WGBH or WGBY and will, therefore, have access to all instructional programming scheduled by The 21 Inch Classroom and the Public Broadcasting Service. These programs will be viewed over the regular cable channels, not on the educational access channels. Many areas may find, however, that the open-air scheduling is inconvenient for their local school schedule. Also, commercial networks may broadcast specials late in the evening which teachers will want to use during the day.

We recommend that arrangements be made to videotape and store as many off-air educational programs as practical for later cablecasting on the educational access channel. This again involves getting the permission of the copyright holder. Permission is generally easier to obtain for a one-time replay for educational purposes (usually within twenty-four hours of the original broadcast) than for continued storage and unlimited use.

The Massachusetts Executive Committee for Educational Television (producers of The 21 Inch Classroom programs) will, on request, grant permission to member schools to tape MECET programs directly off the air for replay on a local schedule. MECET will also make available to member schools ¾" videotape cassettes of programs to which they have copyrights. In addition, MECET will be providing other programming materials for closed circuit television systems. Membership in The 21 Inch Classroom is available to all school systems in the Commonwealth at a cost of 75c per student. One-half this cost is reimbursed to the cities and towns by the state. Membership fees contribute to the cost of new production and entitle schools to a variety of teacher and student materials, workshops and technical assistance. It is possible that some cable owners might agree to bear or share the cost of MECET membership for it would give them access to a sizable amount of programming.

MECET is currently negotiating with other instructional television producers whose programs are part of The 21 Inch Classroom schedule for permission to offer tapes of these series as well.

Producing Educational Material for Cablecast

A recent half-hour instructional television program produced by professionals for open air broadcast listed six people in the credits, not including the cast. An additional fifteen people were involved in the production at one time or another over a period of six months. It took four full days to tape the show and an additional four days of editing and polishing. Thus, a videotaped instructional television program was born.

It all started from a need expressed by teachers for a program on a particular subject for a particular grade. Two months were spent researching those aspects of the subject pertinent to the particular age group. An additional two months were spent writing and refining the script, choosing and rehearsing the cast. The final two months were spent in the studio.

At the other end of the spectrum a high school student with portable videotape equipment can interview teachers on a curriculum issue and put together a documentary on teacher opinion in a matter of hours. It can be cablecast to the community the same week. It can and has been done and done successfully. But the student probably did nothing else all week and this week probably followed a period of intensive training in production technique.

Unfortunately, there is no known relationship between the amount of time or money spent and the quality of the production. There is also no guarantee that anyone will be interested in watching locally produced material. It is a frustrating business.

The fact is, not too many communities are actually producing original material. Those that are have generally limited themselves to one hour of programming a week and this is usually a full-time effort for a whole crew of people.

WHERE DOES A COMMUNITY BEGIN?

Defining Goals for Cable

Local production can serve many goals both as a means to an end and as an end in itself. Before jumping into production, however, educators will need to assess precisely what their goals are and then formulate a realistic plan for achieving them.

Some local production might serve to supplement curriculum in the same manner as the Children's Television Workshop or The 21 Inch Classroom programs. Remember, however, that these are multi-million dollar ventures, not easily duplicated on a local level. Further, the media is backed up with extensive classroom utilization, teacher training and evaluation projects. Another goal of local origination is to exchange information between schools and between schools and the community, allowing a wide spectrum of individuals to become involved in the process of education and

the decision making apparatus of existing educational administration. A third goal of local production is to open up school programs to community groups not in schools and to create new educational opportunities that expand traditional definitions of student and school. Examples of how various communities have interpreted these goals are listed later in this chapter.

But, local production can be a learning objective in and of itself, if students, teachers, parents and administrators are all involved. The production of even a five-minute program involves such a wealth of learning opportunity and such a diversity of skills, both technical and verbal, that its impact on education cannot be neglected or left to chance. It is not the availability of cable technology in and of itself that will revolutionize the educational process but its availability as a distribution resource to open up avenues for new forms of communication and new modes of learning on a local level. From this point of view it may alter traditional time schedules and it may alter the traditional relationships of the teaching/learning process.

Staffing for Local Production

There are two types of people essential for television production —one with creative vision and one with technical know-how. These qualities are not often found in the same person. If you have invested a great deal of money in studio equipment you will want to protect that investment with a person who knows and loves the machines, who can get them to work, who can fix them when they break and who feels comfortable with them. This individual should love the equipment enough to protect it but not so much that no one else can touch it. But a technical person cannot assess educational goals or create programming. Responsibility for local production, therefore, should be vested in a creative educator who can identify curriculum needs, define behavioral objectives, translate these into media-based projects including utilization and evaluation mechanisms, who is alert to situations that should be recorded for teaching, learning, sharing or posterity and who can teach these skills to a variety of individuals.

This individual, if not already a part of your staff should be found as soon as possible and should begin working with students, teachers, paraprofessionals and parents as soon as production equipment is available. If your budget does not yet permit either a new staff position or production equipment you may find individuals within the community who will donate some time and bring their own equipment. Refer also to Appendix 3 which lists institutions within the Commonwealth that have studio facilities. Local colleges may trade production expertise for student teaching positions. Note also that the Massachusetts Executive Committee for Educational Television offers videotape workshops to member schools.

One major problem schools may face in both training and actual production is time. Half-hour or forty-five minute blocks are not sufficient to really get going. Teachers may not be interested in staying after school hours and students may not be able to get home if they stay late. This drawback can be tempered by the realization that it is neither necessary nor desirable for everyone to be involved. Further, many will have neither the interest nor the aptitude. Schools should aim for a sufficient number of committed and trained people to produce a reasonable amount of quality programming that will achieve their goals.

A second problem may arise because only a limited number of people can actively participate at one time. An average group will consist of a director, one or more camerapeople, one or more sound people and the cast. Training groups, therefore, may not correspond to class size, if the training is to provide hands-on experience with the equipment.

Concomitant with training, there should be continuous evaluation. Not everything produced need be put on the cable. Early evaluation can take place with only a videocassette player, a television and a room full of people. Videotape, unlike film, processes itself and can be shown (and thus evaluated) immediately. It can also be reused so some amount of experimentation may be encouraged. When you have developed material you are truly proud of and that has something to communicate, then you will want to distribute it through the cable.

HOW WILL ACCESS CHANNEL TIME BE ALLOCATED?

At this stage in the history of local access, so few groups have requested time on any access channel that needs have easily been met on a first come, first served basis. In general, the cable industry has so little material with which to fulfill their local origination requirements (systems with 3,500 or more subscribers must originate local programming), that anyone who offers to be responsible for programming is usually welcomed.

It is unwise, however, for a community to allow educational programming to grow haphazardly. First, it is sure to create animosity among educational factions in the future, particularly as cable potential grows. Secondly, if specific people or groups accept responsibility for scheduling a certain number of hours of programming and the objective of those hours is clearly defined, access channels will really be used. Such a plan also allows potential audiences to anticipate and plan for cable viewing.

Consider, for example, the following local plan. An hypothetical urban community with a population of about 100,000 has 23 Elementary Schools, 4 Junior High Schools, 2 High Schools, a Vocational School, a Junior College, a University and a main Library with four branches. Studio facilities exist in one High School, the Vocational School and the Junior College and are anticipated for a Middle School. The cable system in the city dedicated two channels to educational access.

Initially, it was planned that the majority of the air time would be filled with pre-programmed materials such as films, videotapes and slide/tape presentations. The time slots from 5 a.m. to 9 a.m. were assigned to the Junior College (both channels) for adult education programming. It was assumed that some programs would originate from the Junior College almost as soon as the system was built and that they would import taped programs from the University. It was also assumed that the same programming would be repeated daily (but at different times) for periods up to several weeks, thus reducing the demand for new material on a daily basis.

From 9 a.m. to 2 p.m., both channels were put aside for "in-school" use, with one channel earmarked for grades K-6, and the other for grades 7-12. A conscious agreement was made to avoid scheduling programs on the educational channel at the same time that programs geared to the same age level were being offered on regular broadcast channels. For example, at 10 a.m. when "Sesame Street" was on, the K-6 channel was scheduled to serve 5th and 6th grades rather than 1st or 2nd.

From 2 p.m. to 3:30 p.m., both channels were scheduled for teacher training, with the hope that in-service specials might grow to formal graduate courses for which credit would be given by the University. Home subscribers might also avail themselves of these courses. For full benefit, however, each participant would have to pick up course guides and notes from the University. The sale of these materials plus exam fees would help to finance the courses, all of which (it was assumed) would be created at the University and ultimately aired over several other CATV systems.

The time from 3:30 to 11 p.m. was split between the Vocational School, the Junior College and the High School with the Junior College assigned program responsibility for one full channel and the High School and Vocational School sharing the other. Arrangements were also specified as to which groups would use which studio. It is not to be implied here that there was any expectation on the part of those involved that more than a few hours per week of total finished product would come from within the school system. As with the daytime programming, it was assumed that the majority of the evening educational channel cable time would be filled with films and videotapes with only one or two hours per week devoted to locally produced communications.

Another way to allocate time is on a first come, first served basis. In this case, someone would need to take responsibility for gathering all existing material that can be cablecast, compiling and distributing a master list, and communicating both tape and information to the head end when necessary. School hours might be programmed on a by request basis by teachers; the schedule for after-school hours might be determined by a committee which might also serve to review new purchases.

PROGRAMMING SUGGESTIONS

Videotape production offers opportunities limited only by imagination. In one school, a cable crew wandered unannounced into elementary classes the last week of school taping two to three minute sequences which were edited into a video collage called "The Last Days of School." It was later cablecast on the local news program. On Clean-Up Day in another town, a student cable crew surprised workers dredging garbage out of the river and featured the story on an environmental program that weekend. Elsewhere, students are preparing a local history by interviewing elderly community residents. In Western Massachusetts a town meeting was cablecast by a combined college-high school reporting and production team following an initial suggestion by Selectmen. For ten hours tapes were relayed by car from the scene of the action to the nearest origination point where they were cabled to the waiting audience.

Is there a science teacher with a mesmerizing way of presenting experiments? The cable can share his or her talents with other science classes. Can teachers share their expertise with citizens who want to know how to use ceramics, fix their cars or learn a language? Will the local cobbler invite cable in for the day to watch him work? The cable can help good teachers be in more than one place at one time.

In thinking about programming for individuals who cannot be reached in the schools, remember that they must be cable subscribers if you expect them to watch the program at home. For example, teacher training via cable is an excellent idea if all the teachers live in the community and are cable subscribers. The community might consider setting up local viewing centers (in day care centers, libraries etc.) or making school buildings open to

the public in the late afternoon and early evening for non-subscribers.

We think, too, that it will be a while before there are so many channels available that you can realistically program for very specific, small audiences (e.g., handicapped students) except on an experimental basis.

Preschoolers

- In New York, numbers and letters are taught to non-English-speaking families with monthly orientation workshops for parents of small children.
- "The Gingerbread Lady" in Kansas draws illustrations for and reads stories listeners have sent in.
- "Tree House Time" in Beloit, Wisconsin invites Boy Scouts, Brownies, dancers, singers and magicians to perform.
- "Spellbound" in Long Beach, California, teaches basic words and numbers.

It is entirely likely that as cable grows, syndicated children's series will be developed and marketed specifically for cable use. This will make it easier for cable operators to program but may stifle the impetus for local origination, which should be the essence of cable.

Elementary Grades

- In Amherst, Massachusetts, fifth graders videotaped a maple sugar documentary. On a visit to the farm, they demonstrated the technique of tapping trees and interviewed the farmer. The quantity and quality of information was surprising.
- A third grade did a study on local traffic safety using portable equipment on local streets, municipal parking lots and around school buildings. This was presented to younger students as part of a safety instruction course.
- "Taking Care of Pets" was put together by another third grade whose members demonstrated feeding, brushing, walking and training their own animals. The taped performance was later used for lower grades, and cablecast to other elementary schools and parents.
- In New Jersey, a fifth and sixth grade "Decision, Drugs and Me" program was shared with parents via cable.
- In New York City, fourth graders produced a program on self-protection in the streets.
- "Kids Today" in Malden invites classes to the cable studio to participate in live cablecasts based on their ideas.

Secondary Schools

- Drop-outs in St. Cloud, Minnesota pick up necessary materials at the Drop-In Center and follow programs on an off-campus cablecast.
- In Virginia a group unit on pollution filmed polluted areas and polluters, recycling centers, student littering activities and drivers parked with motors running.
- New York students studying health did a two-hour on-the-spot videotape in the local hospital emergency room.
- Biology students use portable equipment to record plant and animal life in the local ponds and woods.
- An Illinois high school academic bowl series airs student views on current issues via cable.
- Journalism students in San Diego produce shows sponsored by a local bank. One-half of the ad money goes to the cable company to cover production costs, and one-half goes to pay for film videotape. Students do human interest, mini-documentary and news shows. It has given the community a fresh look at itself, and promoted good public relations for the bank. (This kind of arrangement, if it included commercials, could not be shown on the educational access channels.)

Consider also:

- Cablecasting summer school courses, high school equivalency courses, SAT review courses etc.
- Sharing the cost of special speakers and performers with several communities.
- Videotaping group interactions for study in psychology and sociology courses.
- Bringing advanced placement courses to the high school via cable.
- Dividing Driver Education course into two parts. Cablecast the lecture part in early evening; use in-school time for more behind the wheel training. The same approach might be used with all vocational training.
- Using the human resources in the community for vocational awareness programs.
- Student internships and communication courses. In Denison, Texas, Channel 2 is a student-staffed operation directed by a doctoral candidate from a nearby college. He is the only paid staff member.

High school juniors and seniors make up crews which

a) tape lectures by teachers
b) produce standard weekly programs: "Know Your Schools," "School Personalities," "Show and Tell"
c) cover sports events
d) write and produce documentaries.

Students receive credit for gaining expertise in handling equipment, operating as part of a production unit, learning what it means to have control of an opinion-making media, gaining valuable vocational experience. The local cable operator hires student crews to help with regular system production.

Colleges
In addition to the many services college, public schools and community cooperation make possible, cable offers the college itself a wide range of options. Oregon State University provides an unusual example of how cable can be used profitably in higher education.

At OSU, courses, review work and supplementary materials via cable relieve classroom crowding and parking problems, reduce on the job staff needs and allow the community at large to participate for credit or enrichment. Seventy percent of the student body views some part of their course work off-campus.

- Faculty, graduate assistants and education students make videotapes and play them back for evaluation.
- Off-campus viewing eases pressure on space, time and grounds costs, makes it easier to schedule increasing numbers of students, particularly evening classes.
- Sold-out sports events, special guest programs, public event programs and local issue coverage serve the general public.
- The FM band connected to language labs transmits up to four hours daily of four foreign languages.
- Teachers in training observe students at work in public school classrooms which have become an educational laboratory for the college.

In Massachusetts both Greenfield and Mount Wachusett Community Colleges have embarked on extensive use of cable, bringing speakers to the community and keeping residents informed on local issues.

- In-service training for both teachers and administrators via cable makes efficient use of specialists' time. It also simplifies space needs and transportation if instructors cablecast to school centers from a central studio with lectures, demonstrations and audiovisual materials. Once these have been received, small groups can discuss and feedback questions by phone.
- Colleges in wired communities can cablecast courses for credit in off-campus programs to teachers who need meet only occasionally as groups on campus.
- Cable can be used to get messages to large numbers of staff or students. Crucial issues can be explained and feedback provided from each school faculty after discussion.

Parents
Parents can share in classroom activities, special programs, receive orientation to schools, introduction to teachers, audit courses their children are taking, watch assemblies, enjoy special plays, take second language courses or, as in Oregon, participate in special courses for parents, e.g., "Modern Math for Parents" or "The Politics of Learning." Cable can be used to share School Committee meetings, budget discussions and curriculum forums.

WHERE WILL THE MONEY COME FROM?

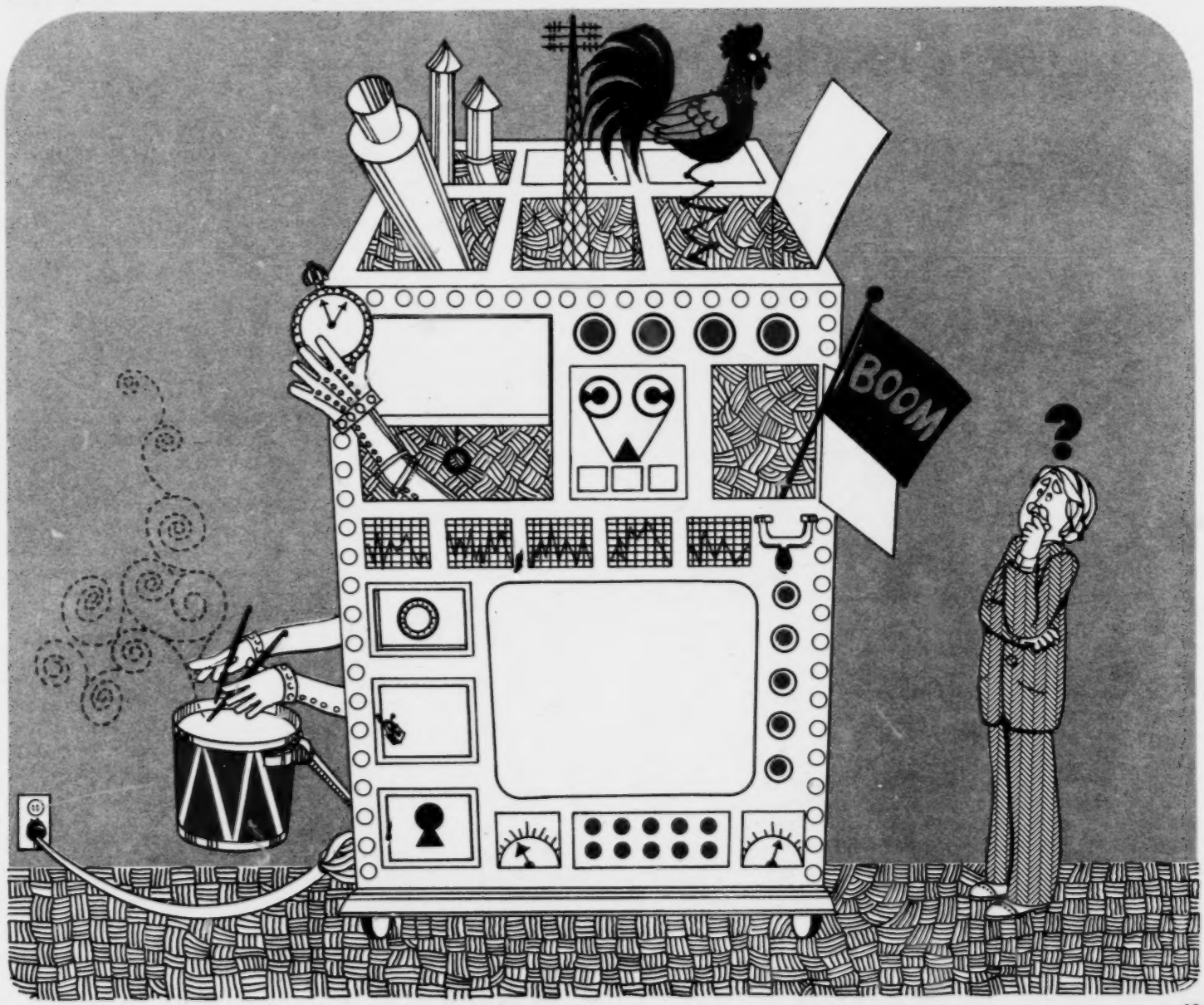
For long-range planning, funding will probably have to come from a traditional source: the budget. The issue of budget requests, however, should not focus on cable. Allocations for cable projects can come from a variety of standard budget items — curriculum planning, audiovisual materials, evaluation, building renovation, teacher training etc.

For small local projects, funding might come from within the community as it did from the bank in San Diego. You will need to thank your sponsors in some way other than commercials, however. Also, a school district having its own studio can charge nominal fees to organizations using the studio.

The federal government has not been quick to fund specific cable projects. However, in June 1973, the National Center for Educational Technology (part of the Office of Education) issued a document entitled "Potential Federal Sources of Funds for Educational Technology Projects in Fiscal Year 74" (see Appendix 4). Although it is qualified with warnings that potential funding may never become available, it seems a reasonable place to begin looking.

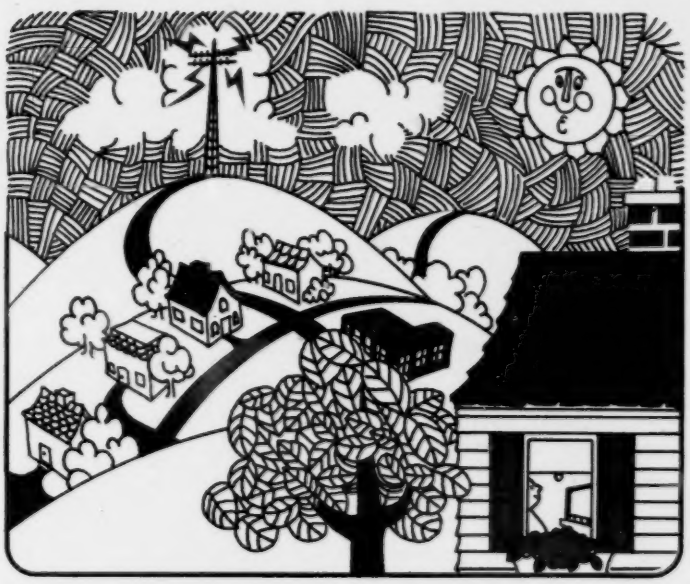
Communities considering major curriculum programming should look for others with similar needs. Cooperation will reduce the cost to individual communities and prevent reinvention of the wheel.

PART 2 / CABLE BASICS



PART 2/CHAPTER 4

CABLE TECHNOLOGY



Traditional cable systems receive signals from the air (VHF, UHF, FM) and transmit them throughout a community on coaxial cable. The process from the antenna to the home television set is summarized graphically in Figure 1 (see next page). It is neither mystifying nor terribly complex. It is, simply, a way of getting from one place to several others at the same time.

"Off-the-air" signals are picked up by antennas, usually mounted on a high tower and/or a hill top. Generally, individual antennas are used for each channel so that the antenna characteristics can be matched closely to the frequency of the channel. Individual cables bring the signals from the antenna to the *head end*. This is where all signals originate in today's conventional one-way cable system. Locally originated programming can also be fed into the head end along with off-the-air signals.

The head end performs several functions.

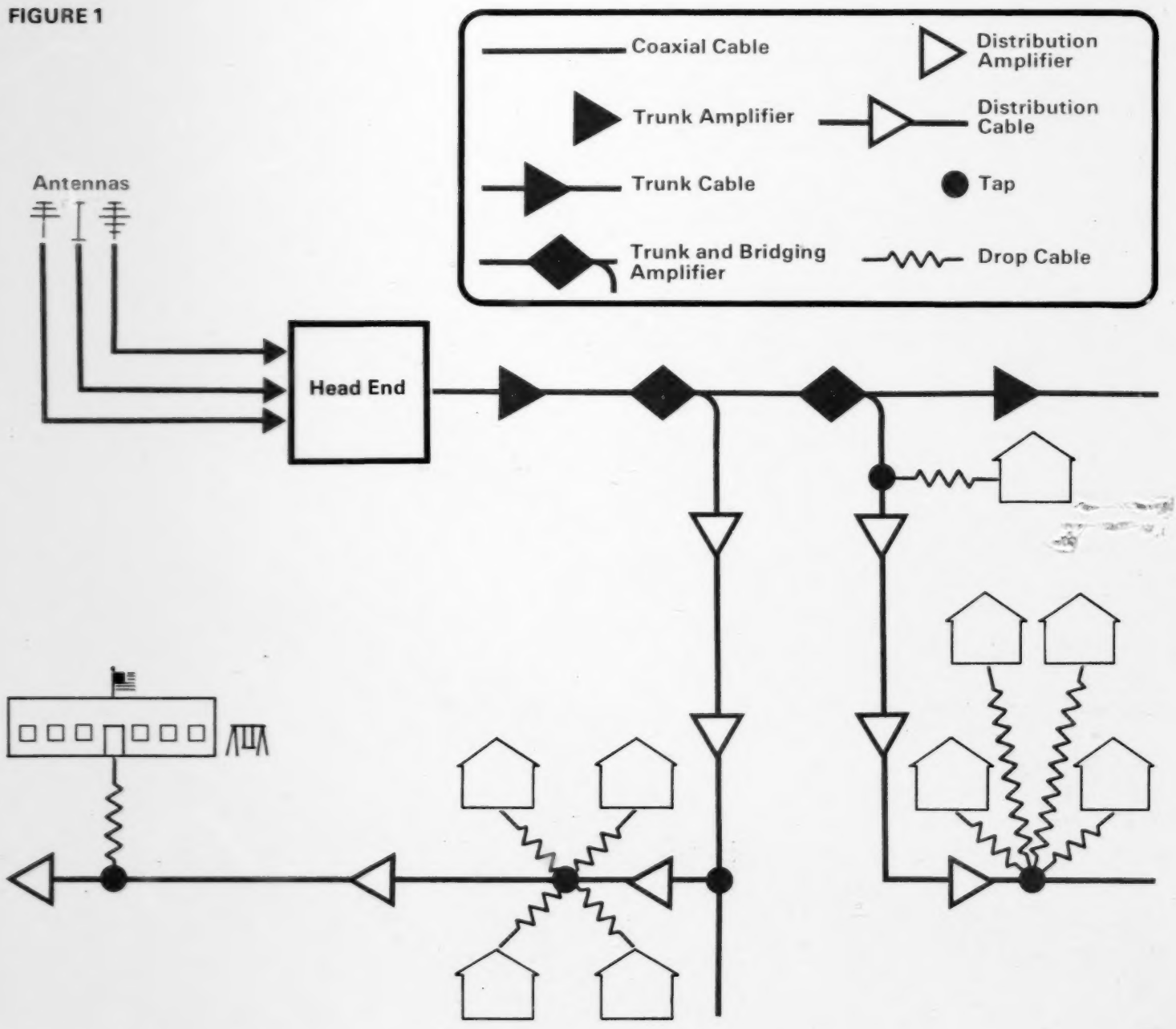
- It amplifies signals from the antennas.
- It equalizes the level of various channels and provides for separate control of pictures and sound, minimizing distortion.
- In systems with twelve or fewer channels, it translates channels into standard VHF channels (e.g., Channel 44 might be translated to the frequency of Channel 2). In larger systems with more than twelve channels, channels are translated into new frequencies, some of which are not equivalent to any standard VHF channel.
- It performs various housekeeping functions on the cable, such as filtering out spurious signals and monitoring system performance.

Generally the head end is located at a considerable distance from the population center. The signals are transported over a *trunk cable system* which consists of a large coaxial cable, usually between ¾" and 1" in diameter and a series of main trunk amplifiers. A *coaxial cable* consists of a single inner conductor, a layer of insulation and a tubular outer conductor. The conductors are made of copper or aluminum and the insulation is most commonly foamed plastic or air. As signals travel from the head end down the cable, they diminish in strength. The larger the cable, the more slowly this happens. But larger cable is more costly. Trunk amplifiers are located at regular intervals along the trunk cable to boost the signal and compensate for the loss in the cable.

Distribution cables are generally smaller coaxial cables and are run from designated spots in the trunk cable to serve subscribers in a given area. They intersect the trunk cable using a *trunk and bridging amplifier* which boosts and isolates the signal. This isolation is necessary so that a fault on a distribution cable will not interfere with the main line signal going down the trunk. Like on the trunk cable, *distribution amplifiers* are located at regular intervals on the distribution cable to compensate for the gradual loss in signal strength.

A *tap* or splitter is used to connect a *drop cable* (or individual connection) to a subscriber. Taps are commonly provided for one to four drops and must be selected so that a standard signal level is provided at each individual subscriber's location. The tap isolates the drop from the distribution cable so that if one subscriber's equipment becomes short-circuited or produces spurious signals it will not short-circuit or degrade the signal going to other subscribers.

FIGURE 1


Coaxial Cable
Distribution Amplifier
Trunk Amplifier
Distribution Cable
Trunk Cable
Tap
Trunk and Bridging Amplifier
Drop Cable
Antennas
Head End

In early systems it was possible to connect the cable directly to a subscriber's television set. However, in systems with more than twelve channels, a *converter* is needed to translate the signals into frequencies that can be received and detected by the cabled set. In the future, television sets that can receive twenty or more VHF channels directly may be available. Manufacturers have been reluctant to undertake development until firm industry standards are agreed upon.

PART 2/CHAPTER 5

CABLE ECONOMICS

For the past ten or more years, individuals with a little money to spare and a large desire to make money easily have discussed investing in cable television with the same excitement previously generated for soybean futures. It was a way to make a killing. This may have been true when licenses were bought and sold without a foot of cable ever being laid. Nowadays, regulations preclude what was commonly called "trafficking in licenses." When a license is granted, the license holder must build a cable system in a specified period of time. Local conditions may make this a more or less capital-intensive venture. Local conditions will also determine if the rate of return on that investment will justify the initial expense.

LOCAL CHARACTERISTICS

Through easily obtainable local information, a community can be defined in cable terms. The number of *homes* in a community, defined as occupied housing units, determines the maximum number of potential subscribers to a residential cable system. The number of *street miles* in a community approximates the actual size of the cable system, since the cable usually follows street patterns to reach homes. Not all streets will necessarily be wired, however, as in some cases the cable will not follow the street pattern and in others, streets will have no potential subscribers. *Density,* the number of homes per mile, puts these two factors in relationship to one another and distinguishes one locality from another in cable terms.

There are places with the same number of homes but quite different mileage (Adams has 7,187 homes and 57 miles; Barnstable, with 7,108 homes has 256 miles) and the same number of miles but quite different numbers of homes. The question of how many homes are passed by each mile of cable determines the revenue base for the system.

One mile of cable passing thirty homes (Hatfield) will yield quite different monthly revenues from one mile of cable passing 300 homes (Cambridge). If 100% of the people in Hatfield subscribe to a cable system at $7 per month, it will generate the same revenue as if 10% of the people in Cambridge subscribe at $7 per month. In each case there would be thirty subscribers per mile. However, in Cambridge, there would still exist the potential of 270 additional subscribers, whereas in Hatfield the entire subscriber potential would have been tapped.

Cable economics are further specified by whether the cable is constructed *overhead* or *underground*. In order to estimate the cost of building a cable system, it is essential to know just how each mile of cable will be installed.

In general, cable will go underground where existing utilities are underground. Some municipalities have ordinances which require the gradual undergrounding of all utilities over time, in some cases 5% per year. In other cases, only new construction must put wiring underground. The percentage of underground utilities varies widely across the state. Most rural places have none while most suburbs and small towns have some, for example, 4% in Newton and 30% in Belmont. Undergrounding is heaviest in Boston—about half the city overall. Somerville (21%), Brookline (41%) and Revere (3.7%) further show the range.

Thus, it is important to know your own community and to determine how desirable a place it is from a cable operator's point of view.

General Considerations
The three local characteristics *(homes, miles and percent underground)* make it possible to estimate roughly the costs and revenues of a cable system. The density of homes per mile provides the first measure of comparative viability among different areas. The higher the density, the greater the number of potential subscribers per mile.

The density of an area is offset by how much it costs to reach the homes along each mile. Two areas of equal density will not necessarily have the same costs, if one must absorb the increased cost of installing cable underground. For instance, both Quincy (28,488 homes, 181 miles) and Worcester (56,606 homes, 355 miles) have the same density—157 homes per mile. In Quincy, about 2% of the existing utilities is underground; in Worcester, about 13% is underground. Relatively speaking, the 157 homes on the Worcester mile will be considerably more expensive to reach than the 157 homes on the Quincy mile. These costs can further be compared with Provincetown (2,362 homes, 15 miles) where there are also 157 homes per mile (many of which are only used in the summer) and no underground wiring.

BUILDING COSTS
Initial capital costs include only the cost of building a basic cable system to carry broadcast signals. These are followed by yearly operating costs once the system is in place. All costs involved in the construction and operation of a cable distribution system can be seen as proportional to either the number of subscribers or the number of miles built to reach those subscribers (see Figure 2).

When a new service is introduced, such as pay television or shopping by cable, it brings along its own universe of economics which is added to the costs of the basic system. A service can generally be broken down into the same categories as shown below and its cost also can be estimated. For example, a service may require additional fixed costs, such as a local origination studio, or proportional costs, such as a terminal for each subscriber.

MILE-RELATED CAPITAL	SUBSCRIBER-RELATED CAPITAL
Aerial Labor	Aerial Drops
Underground Labor	Underground Drops
Electronics	Converters
Pole Rearrangement	Terminals
Tools and Test Equipment	
Inventory	
Engineering	

MILE-RELATED OPERATING	SUBSCRIBER-RELATED OPERATING
Pole Rental	Sales
Duct Rental	Billing
Power	Rent
Vehicle	Vehicle
Repair and Maintenance	Advertising and Promotion

FIXED COSTS	PERSONNEL
Head end	Management
Computer	Plant Technicians
Microwave	Service Technicians
Purchased Programming	Clerical

Mile-related capital costs cover the actual construction of the system: the cost of the cable and associated electronics, the engineering survey which lays out the construction pattern and the charge for moving existing utility wires to make room for the cable.

Subscriber-related capital costs cover connecting subscribers to the system and outfitting them, if necessary, with channel converters which replace the TV set channel selectors or A/B switches which convert each channel on the dial to two channels.

Mile-related operating costs cover maintaining and operating the plant: the yearly cost of renting space on utility poles or in underground conduits, the cost of electricity to power the system and the cost of repairing damaged cable.

Subscriber-related operating costs cover servicing subscribers and running the system's office: the cost of subscriber billing, advertising, service calls and rent.

ESTIMATING UNIT COSTS
While a unit cost can be given to each category, the accuracy of each estimate is not equally important, nor will any particular cost necessarily be the same.

The greatest initial cost outlay will be for the installation of the basic system. Aerial construction may start as low as $4,000 and range as high as $15,000 per aerial mile. Likewise, the cost of undergrounding will vary widely, even within the same municipality. In places where cable can be buried directly in sandy soil, the

per mile cost may be no higher than for aerial construction. As digging occurs in increasingly more difficult conditions (rock, asphalt, concrete), the per mile costs will rise. In heavily urbanized areas where sidewalks must be taken up to bury new conduits under the street, the costs will be astronomical. (The often-quoted figure for extraordinary undergrounding is the New York City-TelePrompter estimate of $100,000 per mile.) Downtown Boston is the comparable Massachusetts example.

The cost of rearranging existing wires on utility poles is also significant, but its range is smaller than that of installation costs and starts much lower—$400-$700 per aerial mile. In areas with significant undergrounding, pole rearrangement costs will be correspondingly lower.

Subscriber drops are usually cited at $20 per aerial connection and $35 per underground hookup, including both hardware and installation. Channel converters can range from $35-$50 per subscriber, depending on quality and capacity.

The most significant cost in operating the aerial plant is that of pole rental. Systems pay a yearly charge to the utility company for space on each pole. By counting the number of poles per mile (usually about fifty), a per aerial mile cost can be derived. In Massachusetts, pole rental seems to be somewhat higher than in other states—about $4.80-$6.96 per pole per year. The cost of providing power to energize the system is low in comparison—starting at about $20 per mile and increasing with the size of the system.

The significant cost for servicing subscribers comes in billing, which varies with the number of people receiving bills, i.e., the current subscribers. Rent, advertising and promotion are generally figured in relation to the number of final subscribers, ranging from $1.00-$2.00 per subscriber per year.

FIXED COSTS

Capital and operating costs cover the construction and operation of the network of wires, but do not include the fixed costs associated with the head end, where signals are sent out through the system. The cost of the head end is not proportional to either the number of homes, or the number of miles, but is proportional to the number of channels on the system and the strength of the signals picked up by the head end antennas.

As a result, the head end can be quite inexpensive and is sometimes little more than a super home antenna, as in the case of some low capacity rural systems. Or the head end can be a more elaborate setup comprised of tower, antennas and a building housing electronic processing equipment. In general, the tower-type head end will not cost less than $50,000 or more than $200,000, with the differences accounted for in the cost of microwave and more sophisticated electronics necessary for greater channel capacity.

OTHER COSTS

All costs associated with the basic system have been covered so far, except those involved with the people necessary to run the system. Personnel costs can be seen as fixed, proportional and quasi-proportional, depending upon how the number of employees is figured. The administrative staff is usually of a fixed size, but may be seen as a ratio to the total number of employees. Service technicians who answer service calls and clerical workers who staff the office are related to the number of subscribers (often set at 2:3,000 subscribers). Line technicians who maintain the plant are similarly related to the number of miles of plant (for example, 1:75 miles). The salaries paid to these people, as well as social security, payroll taxes, benefits and raises, determine yearly personnel costs.

Other costs to anticipate in building and operating a system are of a similar nature to those outlined above. Property tax, for instance, is figured on the worth of physical assets (the plant itself and buildings owned by the system).

HOW DOES A SYSTEM GENERATE REVENUES?

The primary revenues for a system are subscribers' monthly fees for basic service. In many instances, systems also charge a one-time installation fee to each subscriber, usually about $15. In early systems, this fee was sometimes as much as $150 in order to raise the capital necessary to build the system. Still other revenues can be derived from second set connections, usually $1.00-$2.00 per month, or from providing additional services.

In projecting system revenues, it is necessary to ascertain the number of subscribers, determined by local participation. Participation (also called penetration) is a percentage of the total homes (potential subscribers). What that percentage means in terms of the number of subscribers is different in each area. If 30% of the homes in Mattapoisset subscribe, there would be 600 subscribers. If 30% of the homes in Brookline subscribe, there would be 6,000. If 30% of the homes in Boston subscribe, there would be 60,000.

Participation grows over time. Generally, subscriber growth is most rapid in the first few years, then tapers off at some final level

in later years. Further, participation is an estimate, which will only be proved or disproved over time. In areas where cable provides the only means of clear television reception, participation is usually high. As cable is built in good reception areas, people will subscribe for different reasons, e.g., educational access channels or additional cable services. Many cable owners hope but have no guarantee that these additions will be an effective means of increasing participation.

Attempts have been made to "predict penetration" using such factors as number of channels available over-the-air, distance from broadcast towers and median income of a community. Because cable systems have little actual experience in suburban and urban settings, the results of such studies are projections and not necessarily indicative of what will happen. In general, 30% participation is considered a conservative estimate, 50% quite good and 70% extremely high.

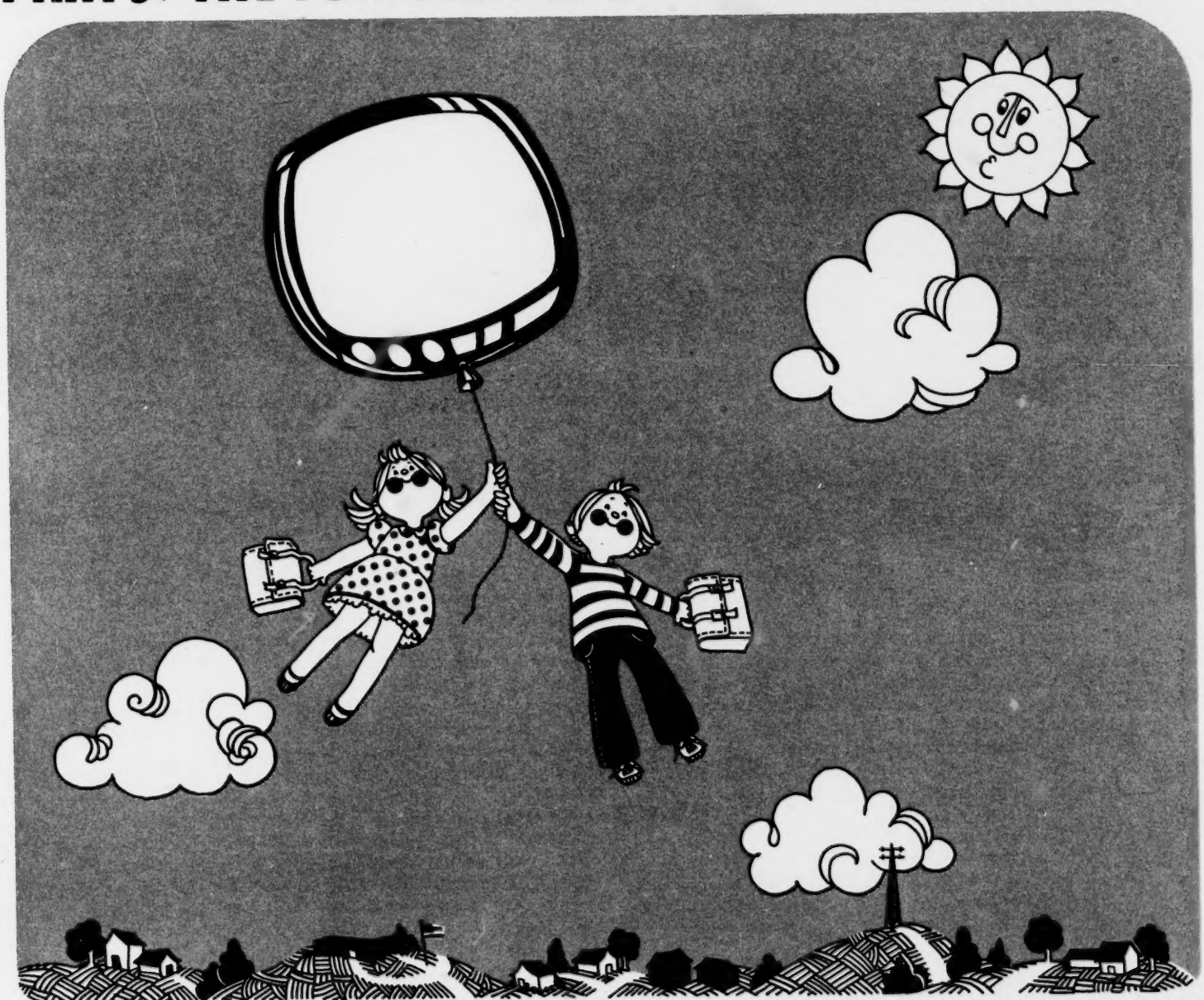
No matter what incentives are offered to increase subscribers, like any utility the cable system has a limited subscriber potential—ranging from none to all homes in the community. The potential subscriber base changes over time only as housing is built or removed in a community.

Participation is only one-half of the revenue equation. Revenues depend on some portion of homes (participation) paying a monthly price. Massachusetts cable law currently sets the maximum at $7.00 per month.

Price and participation are linked to determine revenues—a low price and high participation in one area can be equal to a high price and low participation in another area. If 100% of the homes in Brimfield subscribe at $5.00 per month, the system revenues would be $2,500 per month (500 homes X 100% X $5.00). This would be the same as 25% of the people in Tewksbury subscribing at $2.00 (5,000 homes × 25% × $2.00), or 10% of the people in Springfield subscribing at $.50 per month (5,000 homes × 10% × $.50).

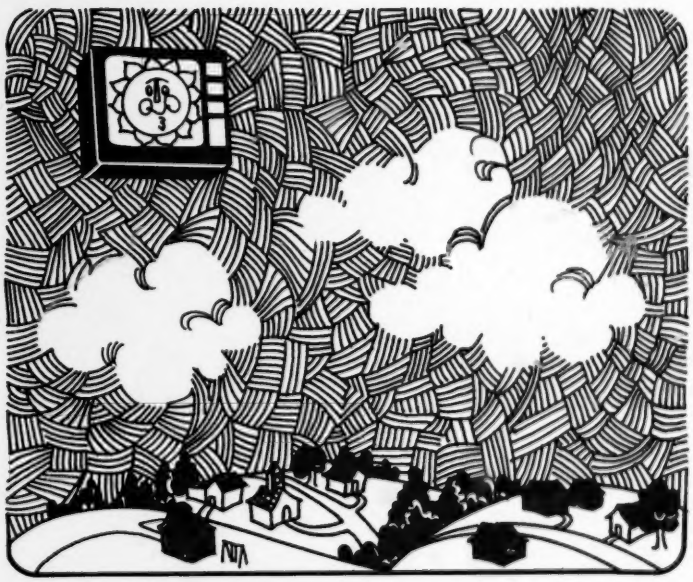
Of course, different systems will need to generate different amounts of revenue to break even depending upon the magnitude of construction and operating costs. Further, different systems will be financed in different ways, requiring more or less revenue to pay off the debt. Finally, the source and type of financing may determine at what point in time the system must begin to break even.

PART 3 / THE TOMORROW OF CABLE IN EDUCATION



PART 3 / CHAPTER 6

BLUE SKY



"Blue sky" is a term commonly used when discussing the future of cable communications. It implies all that people hope, expect or dream cable communications will be able to offer. There is no question that technologically cable can do all the things claimed for it—it can connect classrooms; it can allow a teacher to signal a central library, studio or control room to send out a particular program on a particular channel; it can allow home-bound students to participate actively in school-based classes; it can handle all sorts of data processing. And a cable system can do all of these simultaneously and with fantastic speed. But a distinction must be made between technological capability and putting that capability into practice. To draw an analogy, we are able to send people to the moon and back; yet such a trip is not likely to become widely available in our lifetime.

This is not to imply that full utilization of cable including two-way communication, is a lifetime away. It may well be practical in the next five to ten years, or possibly sooner. It will probably come from the sifted results of experimental projects now taking place across the country. Many of these pilot projects appear promising, but for the most part their costs have been prohibitive for the average school. They have been funded by government or private industry and have reached only a small number of people.

Most economists agree that costs of two-way cable communication will become less prohibitive with increased use—the economy of scale theory. This is undoubtedly true. But before equipment can be mass produced and mass marketed, the technical bugs of two-way communication must be ironed out and industry-wide standards must be set.

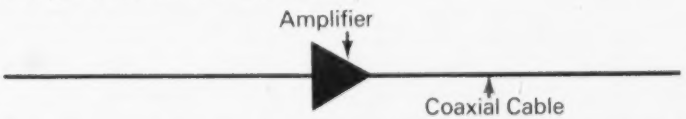
Even if reasonably priced equipment is available, schools will need to assess whether a two-way cable system is necessary or better than other two-way communications systems. We suspect, for example, that where schools have installed computers for data processing, they find phone lines sufficient. If two-way cable becomes a practical reality it will offer greater bandwidth (making more simultaneous transmissions possible) and greater speed than current phone lines. But these capabilities may be solutions to problems no one has faced.

FEDERAL REGULATIONS

Current FCC regulations require that a cable system in a top-100 market maintain a plant which has the technical *"capacity for nonvoice return communications."* It is instructive to reflect on this briefly. *"Return communication"* means two-way: signals flowing upstream, in the opposite direction from the bulk of cablecast material—much like the ladders constructed around dams for salmon to swim upstream to spawn. *"Nonvoice"* is generally interpreted to mean a very limited, narrow band capability—the amount of space on the cable that such communication would require. *"Technical capacity"* is commonly used in the industry to mean, simply, not installing hardware that precludes eventual two-way transmission. It is also instructive to note the following statement by the FCC: *"We do not believe that franchising authorities should require more than we have provided for in our rule because it is possible that any such requirement will exceed the State of the Art or place undue burdens on cable operators in this stage of cable developments."* The FCC will, however, consider such a franchise requirement if the Issuing Authority has a plan for its use.

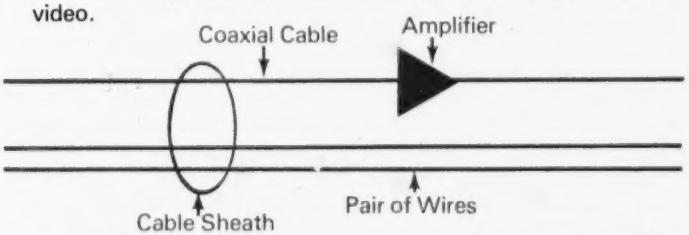
TECHNOLOGY

Conventional cable systems are one-way. Amplifiers boost signals along the cable in one direction.

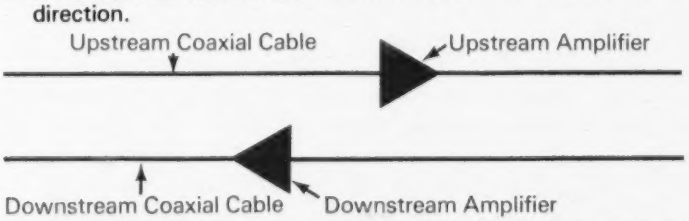


Return transmission (two-way) may be provided in several ways:

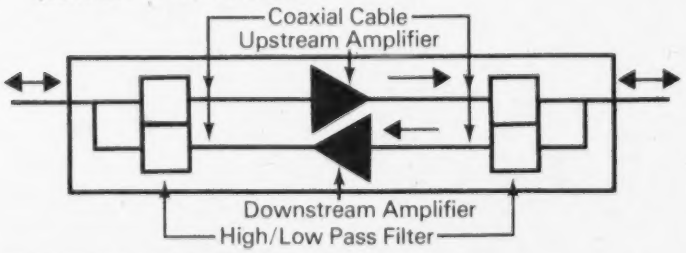
- Pairs of wires can be put in the same sheath as a coaxial cable, or strung with it, or even leased from the telephone company. This will only serve for voice or data transmission, not for video.



- An additional coaxial cable network can be run in the other direction.



- Two-way repeaters can be installed in place of conventional amplifiers. These repeaters use filters to separate bands of frequencies into two directions.



TECHNICAL TRADEOFFS

Since a large part of the installed cost of a system is in labor, it may be economical in the long run to string two cables and delay equipping the return one with electronics until a real need emerges.

The complete dual cable system offers greatest return-channel capacity and has the virtue of technical simplicity but costs the most. Use of wire pairs for return channels is simplest and cheapest but is inflexible and limited in bandwidth. The cable industry is reluctant to commit itself to a single type of system because of technical headaches that have emerged in experiments. Since each subscriber can dump noise into a system and the noise is additive, extreme care must be taken to shield drops and equipment.

ECONOMIC CONSIDERATIONS

Obviously, adding two-way capability increases the cost of a cable system. In addition to the cost of new cables and/or amplifiers, there are cost increases in system design, operation and maintenance. Providing upstream transmission is only part of the cost. Terminals to insert signals from individual subscribers must be provided and multiplexing (distinguishing which signal comes from which subscriber) must be accomplished. There is no industry agreement on the best approach to multiplexing. Hopefully pilot projects will clarify the possibilities.

The transmission costs of two-way cable are more than one-way costs, but less than twice that amount. The following examples show typical cost differentials:

One-way single cable, all aerial construction, 24 channels	
Installation	$2,870 per mile
Cable and Electronics	2,354 per mile
Total	$5,224 per mile

Two-way on single cable, all aerial construction, 24 channels	
Installation	$3,002 per mile
Cable and Electronics	4,026 per mile
Total	$7,028 per mile

Dual cable, all aerial construction, 48 channels	
Installation	$3,668 per mile
Cable and Electronics	4,709 per mile
Total	$8,377 per mile

Two-way transmission may add about $5,000 to the electronics cost of the head end. If a computer is installed as "traffic manager" at the head end, costs begin at around $50,000 and rise with the need for larger memory capacity and more sophisticated software.

Terminal costs are normally quoted in a range between $100 and $1,000, going from simple touchtone keypads to general purpose keyboards with data retrieval and hard copy capabilities. Surprisingly, even low cost terminals can make a critical economic difference. Consider a system with 200 miles of plant and 10,000 subscribers. The increased capital costs for a dual cable distribution system would be $626,000. The increased capital cost of supplying $100 terminals to all subscribers would be $1,000,000. The questions involved in financing, installing and maintaining terminals have a strong bearing on system viability.

EXPERIMENTS IN EDUCATION

Of the score or more pilot projects underway from coast to coast with respect to use of two-way cable, a few are of special interest to educators.

Overland Park, Kansas

One of the first interactive systems was developed by Vicom Manufacturing Company of Dexter, Michigan. Since 1971 a Vicom system has been operating on TeleCable's CATV network in Overland Park, Kansas. The Vicom system is designed to provide either return digital (non-voice) response or complete audio and visual return.

In Overland Park three shut-in handicapped children have been able to interact visually and aurally with teachers and with each other. Both homes and schools have small cameras and amplified telephones. In addition a small touch pad terminal is included. The cost of such equipment may eventually be under $1,000 per student. If so, it may well cost a school less than providing a floating teacher. Note however, that it requires a full channel in both directions.

TeleCable has proposed to expand the network by microwave so that physicians at Kansas University Medical Center can counsel school nurses in Overland Park.

Reston, Virginia

An experiment sponsored by the National Science Foundation and run by the MITRE Corporation has been operating an interactive cable television system in Reston, Virginia, since mid-1971. The Reston cable system is not capable of two-way operation so standard telephone lines are used for the return path. They provide the capability to order and use computer-aided instruction on a video channel. The computer terminal can also be used as an electronic calculator.

To avoid tying up a whole channel with one response, a "frame-grabbing" technique is used. This enables one frame of a TV signal to be stored and repeated continuously to provide a stationary image on the TV screen. The experiment uses videotape recorders to perform this function.

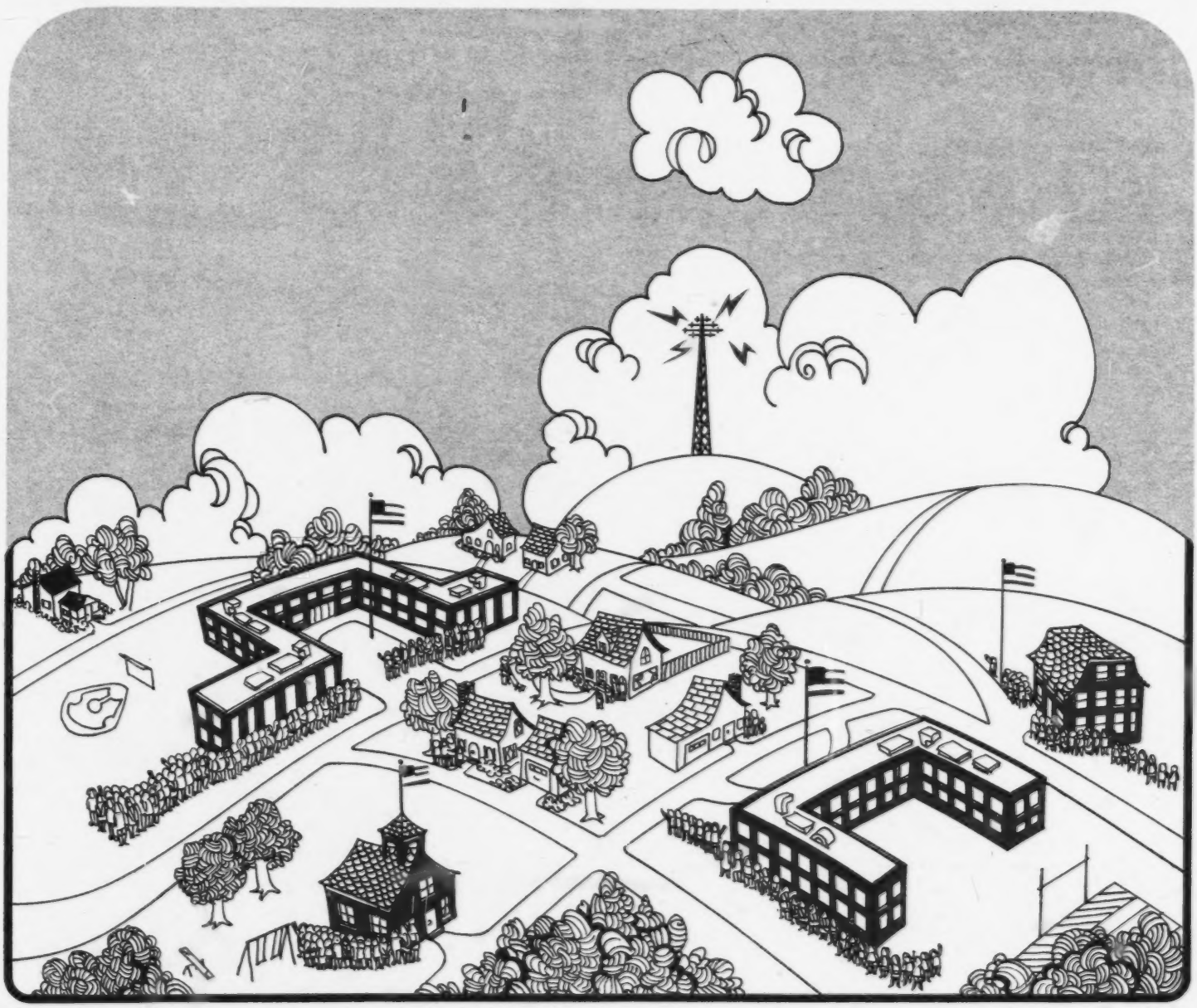
Plans are underway to expand this experiment but there is considerable skepticism on the part of the Fairfax County School System (of which Reston is a part) regarding what will happen if staff and students become used to this instructional mode but do not have funds to continue it.

PROJECTIONS

It all adds up to the fact that a quantum leap in technological technique is necessary before the home viewer really can talk back to a TV set or select printed material from the library, retrieve instant information from anywhere, shop for the week via cable, or more important, before educators can begin to realize the enticing potential which two-way cable communication seems to offer. Schools-without-walls may indeed be in the future in a very real way. Given the present state of the technology, however, we simply do not know.

Further, the ultimate test for two-way cable may well be: "Who will pay for it?" The answer depends on future technology and new applications. It may be that only some form of government financing will bring two-way cable into full use.

PART 4/EDUCATIONAL COMMUNITY ASSESSMENT



PART 4 / CHAPTER 7

ORGANIZING FOR CABLE

In this chapter a process and specific format is suggested to help you personalize the information presented in Parts I, II and III. As we noted in Chapter 1, cable is a local phenomenon. A cable system should be designed and operated to fit the particular structure and needs of a specific community. No book can tell you what those needs are. It can only identify how you might go about finding out for yourself.

We urge you to complete this section but advise you in advance that you will not do so individually or in a single setting. As we have pointed out throughout the text, cable is a long-term proposition and the results of inadequate planning may either benefit or haunt you for a long time.

PROCESS

1. Form a community-wide **EDUCATIONAL ADVISORY COMMITTEE**. Seek representation from:

   - PUBLIC SCHOOL COMMITTEES AND BOARDS OF TRUSTEES OF PRIVATE SCHOOLS
   - SCHOOL SUPERINTENDENTS AND HEADMASTERS
   - PRINCIPALS
   - MASSACHUSETTS TEACHERS ASSOCIATION
   - MEDIA AND/OR COMMUNICATIONS DEPARTMENTS OF LOCAL COLLEGES
   - CURRICULUM COORDINATORS AND/OR PLANNING GROUPS
   - AUDIOVISUAL COORDINATORS
   - LIBRARIANS/MEDIA AND INFORMATION SPECIALISTS
   - PARENT TEACHER ASSOCIATIONS
   - STUDENT GROUPS
   - COMMUNITY EDUCATIONAL GROUPS

   Select one or more members to represent the committee on the Issuing Authority's Cable Advisory Committee.

2. Study **PROCEDURAL REGULATIONS** issued by the Massachusetts Community Antenna Television Commission (Appendix 1), noting at what points it is particularly appropriate and important to make educational needs known.

3. Complete **BASIC MUNICIPAL INFORMATION** form.

4. Complete **CURRENT STATUS OF CABLE IN MUNICIPALITY** form.

5. Complete **EDUCATIONAL COMMUNITY ASSESSMENT** form.

6. Summarize information gathered in (5) to form a list of immediate needs, long-term needs and desirable features, justifying each.

7. Discuss in committee and formulate options for

   - ALLOCATION OF ACCESS CHANNEL TIME
   - USE OF STUDIO FACILITIES
   - TEACHER AWARENESS OF CABLE POTENTIAL
   - ACQUISITION OF PROGRAMS FOR CABLECASTING
   - FUNDING OF EDUCATIONAL PROGRAM PRODUCTION
   - EVALUATION OF USE AND EFFECTIVENESS OF EDUCATIONAL ACCESS CHANNEL
   - LONG RANGE IDENTIFICATION OF PROGRAMMING NEEDS
   - REVIEWING NEW TECHNOLOGICAL DEVELOPMENTS
   - COORDINATING WITH OTHER EDUCATIONAL GROUPS IN REGION, PARTICULARLY ADJACENT COMMUNITIES
   - OVERSEEING COMPLETION OF CABLE SYSTEM AS CONTRACT SPECIFIES
   - COMBINING MEDIA LIBRARIES
   - STANDARD TV SPECIFICATIONS TO BE INCLUDED IN ALL PLANS FOR NEW SCHOOL BUILDINGS
   - BUDGETING RECOMMENDATIONS FOR EXTENSION OF ADEQUATE TV SERVICE TO EXISTING BUILDINGS
   - COORDINATION WITH CABLE MANAGER

basic municipal information

(1) MUNICIPAL GOVERNMENT HEAD:
Identifies the Issuing Authority

Mayor _____
(or)
City Manager _____
(or)
Board of Selectpeople (Star Chairperson)

_____

_____

_____

Items (2) through (5) determine the basic economic viability of a cable system. In general, a community with a high density and a low percentage of underground wiring has the best opportunity to be economically successful. See Chapter 5 for full discussion.

(2) NUMBER OF STREET MILES:
Source: Scaled Street Map

_____

(3) NUMBER OF OCCUPIED HOUSING UNITS:
Identifies total potential subscriber base of cable system.
Source: U.S. Census, Door-to-Door Survey

_____

(4) DENSITY:
Occupied Housing Units/Street Miles

_____

(5) TYPE OF WIRING:
Source: Utility Company Strand Maps

_____ % Aerial

_____ % Underground

notes

Items (6) through (9) relate to the general need within the municipality for cable. If few channels are received and/or reception is poor because of topography of area, the potential for high subscriber participation is good. See Chapter 5 for full discussion.

(6) LIST COMMERCIAL TELEVISION STATIONS NORMALLY RECEIVED WITHOUT CABLE. NOTE CHANNELS WHOSE CLARITY OF RECEPTION IS POOR.

_____

_____

(7) LIST NONCOMMERCIAL EDUCATIONAL STATIONS NORMALLY RECEIVED WITHOUT CABLE.
Lack of station indicates possible educational need for cable. See Chapter 2 for full discussion.

_____ WGBH _____ WGBX _____ WGBY

(8) LIST NONCOMMERCIAL EDUCATIONAL STATIONS RECEIVED BY MICROWAVE SIGNAL OR THROUGH AN ITFS SYSTEM.

_____

_____

(9) NOTE AREAS OF MUNICIPALITY WHERE RECEPTION IS GENERALLY POOR DUE TO TOPOGRAPHY OR PRESENCE OF HIGH BUILDINGS BLOCKING SIGNAL. USING CENSUS TRACT BREAKDOWNS FROM U.S. CENSUS BUREAU, ESTIMATE WHAT PERCENTAGE OF THE POPULATION LIVES IN SUCH AREAS.

_____

_____

_____

_____

_____

notes

current status of cable in municipality

(1) HAS CABLE LICENSE BEEN GRANTED?

_____ YES _____ NO

IF NO, SKIP TO ITEM (30)

Answers to Items (2) through (29) can be found in the franchise document (a matter of public record), from the Issuing Authority or from the cable system owner unless otherwise indicated.

(2) DESCRIBE TYPE OF OWNERSHIP (e.g., private, municipal, non-profit etc.):

_____

(3) OWNER: _____

(4) SYSTEM MANAGER:
Individual you are most likely to need to talk to on a day-to-day basis.

_____

(5) IN WHAT OTHER COMMUNITIES IN THE COMMONWEALTH HAS FRANCHISEE BEEN GRANTED OR APPLIED FOR LICENSE?
Source: *Cable in Mass. 2* for licenses granted prior to October 1971; thereafter the Massachusetts Community Antenna Television Commission. Get in touch with people in other communities to see what their experiences with franchisee have been.

_____

_____

_____

_____

(6) DATE OF CONTRACT:
If prior to 1972; State Law — Chapter 166A — does not apply except for clauses on "grandfathered" systems. If prior to 3/31/72, FCC regulations do not apply. If prior to 3/1/73, state procedural regulations do not apply.

_____

notes

Items (7) through (9) may explain why a franchised system has not been built and/or indicate that all franchise issues are still negotiable.

(7) HAS CONTRACT BEEN REVIEWED BY THE MASSACHUSETTS COMMUNITY ANTENNA TELEVISION COMMISSION? _____
IF YES, FIND OUT WHAT ISSUES ARE PENDING.

_____

_____

_____

(8) HAS CERTIFICATE OF COMPLIANCE BEEN RECEIVED FROM THE FCC? _____

IF NO, WHY NOT? _____

_____

(9) IS LICENSE CURRENTLY BEING CHALLENGED FOR ANY REASON?

_____

IF YES, FIND OUT WHY FROM THE MASSACHUSETTS COMMUNITY ANTENNA TELEVISION COMMISSION.

_____

_____

Items (10) and (11) relate to possible areas for renegotiating franchise.

(10) LENGTH OF CONTRACT:
FCC now requires 15-year maximum

_____

(11) NOTE ANY PROVISIONS IN CONTRACT FOR RENEGOTIATION AND/OR MONITORING OF FRANCHISE BY MUNICIPALITY.

_____

_____

_____

notes

(12) HAS FRANCHISEE FULFILLED CONTRACT OBLIGATIONS REGARDING AREAS TO BE WIRED AND TIMETABLE FOR CONSTRUCTION? _____
If no, schools may still be included through renegotiation. Further, any items that franchisee has agreed to contractually but not fulfilled may be cause to challenge the license.

(13) DESCRIBE CURRENT CONSTRUCTION STATUS OF SYSTEM.

_____

_____

Items (14) through (17) indicate the current economic success of the system. See Chapter 5 for full discussion.

(14) CURRENT NUMBER OF SUBSCRIBERS: _____

(15) INSTALLATION CHARGE: _____

MULTIPLY BY ITEM (14): _____

(16) MONTHLY SERVICE CHARGE: _____

MULTIPLY BY ITEM (14), THEN BY 12 MONTHS FOR ANNUAL REVENUE: _____

(17) ADDITIONAL CHARGES AND NUMBER OF SUBSCRIBERS AFFECTED (e.g., second set connections, special services):

_____

ADD TO FIGURE IN ITEM (16) _____

Items (18) through (29) relate to services offered by cable system.

(18) CHANNEL CAPACITY: _____

(19) IF UNDER 20 CHANNELS AND MUNICIPALITY IS IN A TOP-100 MARKET (see Appendix 2), WHAT PLANS DOES FRANCHISEE HAVE FOR MEETING FCC REQUIREMENTS ON MINIMUM CHANNEL CAPACITY BY MARCH 31, 1977?

_____

_____

_____

notes

(20) COMMERCIAL TELEVISION STATIONS CARRIED BY CABLE?

_____

_____

(21) NON-COMMERCIAL EDUCATIONAL STATIONS CARRIED BY CABLE?

_____WGBH _____ WGBX _____WGBY

(22) WHAT LOCAL ACCESS CHANNELS HAVE BEEN DEDICATED?

PUBLIC ACCESS _____

EDUCATIONAL ACCESS _____

LOCAL GOVERNMENT ACCESS _____

LEASED ACCESS (Note cost of leasing channel)

_____

(23) IF NO ACCESS CHANNELS HAVE BEEN DEDICATED AND SYSTEM IS IN A TOP-100 MARKET, WHAT PLANS DOES FRANCHISEE HAVE FOR MEETING FCC REQUIREMENTS ON ACCESS CHANNELS BY MARCH 31, 1977?

_____

_____

_____

(24) IF ACCESS CHANNELS HAVE BEEN DEDICATED, WHAT INDIVIDUAL OR GROUP IS RESPONSIBLE FOR PROGRAMMING AND WHAT RULES FOR USE EXIST? The FCC requires franchisees to maintain lists of all requests for time on access channels.

PUBLIC ACCESS: _____

_____

EDUCATIONAL ACCESS: _____

_____

LOCAL GOVERNMENT ACCESS: _____

_____

notes

LEASED ACCESS: _____

_____

(25) WHAT PROGRAMMING DOES FRANCHISEE ORIGINATE? Systems licensed after 3/31/72 with more than 3,500 subscribers must originate local programming.

_____

_____

(26) DOES CABLE SYSTEM MAINTAIN STUDIO FACILITIES OR HAVE ARRANGEMENTS TO USE STUDIO FACILITIES? _____

WHERE? _____

EQUIPMENT AVAILABLE: _____

_____

CREATIVE PERSONNEL AVAILABLE: _____

_____

TECHNICAL PERSONNEL AVAILABLE: _____

_____

(27) IS THERE A CHARGE FOR USING THESE FACILITIES? Productions under 5 minutes must be free.

_____

(28) DOES OR WILL THE FRANCHISEE PROVIDE TRAINING IN VIDEOTAPE PRODUCTION? _____

(29) WILL FRANCHISEE LEND PORTABLE PRODUCTION EQUIPMENT TO SCHOOLS? _____

IF NO LICENSE HAS BEEN AWARDED:

(30) HAS CABLE ADVISORY COMMITTEE BEEN FORMED? _____

MEMBERSHIP: _____ (Chairperson)

_____ (Educational Representative)

_____

_____

_____

notes

(31) IS ISSUING AUTHORITY AND/OR CABLE ADVISORY COMMITTEE AWARE OF STATE PROCEDURAL REGULATIONS?

_____

(32) IS ISSUING AUTHORITY ACTIVELY SOLICITING LICENSE APPLICATIONS? _____

(33) HAVE ANY LICENSE APPLICATIONS BEEN RECEIVED? _____

FROM WHOM? _____

_____

HAVE THEY BEEN DENIED? _____

IS ACTION PENDING? _____

(34) **IF APPLICATIONS HAVE BEEN RECEIVED BUT ACTION ON THEM HAS NOT YET BEEN TAKEN, IT IS TIME TO ACT QUICKLY. REVIEW ITEMS (2) THROUGH (29) AGAINST EACH LICENSE APPLICATION AND COMPLETE EDUCATIONAL NEEDS ASSESSMENT SO THAT SPECIFIC RECOMMENDATIONS FOR NEGOTIATION CAN BE MADE TO ISSUING AUTHORITY. CHECK CABLE STATUS (BOTH EDUCATIONAL AND MUNICIPAL) IN CONTIGUOUS COMMUNITIES TO DETERMINE POSSIBILITIES FOR INTERCONNECTION.**

notes

educational needs assessment

(1) TO IDENTIFY MAXIMUM NUMBER OF EDUCATIONAL BUILDINGS ON AN IDEAL CABLE NETWORK, OBTAIN A STREET MAP OF THE COMMUNITY AND NOTE THE LOCATION OF ALL PUBLIC AND PRIVATE, LOCAL AND REGIONAL

- PRESCHOOLS
- ELEMENTARY SCHOOLS
- JUNIOR HIGH OR MIDDLE SCHOOLS
- HIGH SCHOOLS
- VOCATIONAL SCHOOLS
- TECHNICAL SCHOOLS
- JUNIOR COLLEGES
- COLLEGES
- LIBRARIES
- OTHERS
  (Museums, Adult Education Centers, Historical Societies, Arts Centers, Drop-In Centers, Store Front Learning Centers, Penal Institutions with Educational Programs etc.)

Items (2) through (27) should be answered by the head administrator in each building noted above. Interlinear comments relate to how advisory committee might interpret answers.

(2) NAME OF BUILDING: _____

(3) PUBLIC OR PRIVATE: _____

Cable operators have no responsibility to hookup private buildings. Consider asking Issuing Authority to designate all public schools and libraries *and* private, non-profit educational buildings for minimum of single drop and single outlet. To provide for service to buildings which may not yet be constructed, this provision should be for length of the franchise agreement.

(4) ADDRESS OF BUILDING:

_____

IS BUILDING ON A RESIDENTIAL STREET? _____
If not, it may not be on the cable route. For full discussion, see Chapter 2.

notes

(5) CHIEF ADMINISTRATOR AND/OR DELEGATE FOR CABLE PLANNING:

_____

(6) TOTAL NUMBER OF STUDENTS:

_____

(7) GRADE OR AGE RANGE OF STUDENTS: _____

Items (8) through (15) relate to the building structure, identify its current internal wiring status and requirements for internal wiring to provide complete cable service.

(8) WHEN WAS THE BUILDING CONSTRUCTED? _____
Old buildings may be difficult and/or terribly expensive to wire. Most new buildings are being constructed with television wiring in mind.

(9) DESCRIBE EXISTING PLANS AND TIMETABLE FOR MAJOR RENOVATION, ADDITIONS OR RECONSTRUCTION.

_____

_____

_____

_____

(10) DO PLANS QUALIFY FOR REIMBURSEMENT FUNDS UNDER THE STATE BUILDING ASSISTANCE PROGRAM?

_____

(11) DO SUCH PLANS INCLUDE INTERNAL WIRING FOR TELEVISION? _____

Schools identifying plans in (9) should probably not consider internal wiring until the time of construction.

(12) IF CABLE FRANCHISE HAS ALREADY BEEN GRANTED BY MUNICIPALITY, HAS BUILDING BEEN CONNECTED?

SINGLE DROP AND OUTLET: _____

DROP AND OUTLET PER FLOOR: _____

TOTAL INTERNAL WIRING: _____

notes

(13) IF BUILDING IS NOT CONNECTED TO A CABLE SYSTEM, IS IT INTERNALLY WIRED FOR OTHER TELEVISION SERVICE?

Recent wiring may make hookup to community cable easy. Older systems will probably need additional amplifiers to boost signal. Each building in this category should be checked by a systems engineer.

CLOSED CIRCUIT: _____

MASTER ANTENNA: _____

ITFS: _____

OTHER: _____

WHEN WAS WIRING INSTALLED? _____

Items (14) through (16) identify needs of buildings in which there is currently no internal wiring. For a full assessment, a systems engineer should be employed and a cost estimate furnished. See Chapter 2 for a full discussion.

(14) NUMBER OF FLOORS: _____

(15) ATTACH LAYOUT AND DIMENSIONS OF EACH FLOOR.

(16) ON LAYOUT, NOTE ALL LOCATIONS WHERE OUTLETS FOR CABLE RECEPTION IS DESIRABLE. CIRCLE THOSE OF LESSER PRIORITY.
The total number of locations identified in Item (16) will provide a rough cost estimate for internal wiring. Industry's figures range from $40-$100 per outlet. See Chapter 2 for full discussion.

Items (17) through (20) identify the current use of audiovisual materials in schools. The interpretation of these answers is at best subjective. Answers will indicate general sophistication of schools vis-à-vis using a variety of instructional media. Consider also that with a full cable system the storage and distribution of a great deal of audiovisual equipment might be eliminated or at least centralized. Likewise, the storage and distribution of audiovisual materials would be centralized. Further, through a centralized cable distribution system, budgets from different educational interest groups might be combined for maximum implementation.

notes

(17) AUDIOVISUAL EQUIPMENT

	Type	Number	Age	Condition	Frequency of Use Per Classroom
Film Projectors					
Slide Projectors					
Videotape Recorders					
Videotape Players					
Audio Tape Recorders					
Record Players					
Overhead Projectors					
Television Receivers					
Black and White					
Color					
Radios					
AM					
FM					
CAI Terminals					
Language Laboratories					

notes

(18) IDENTIFY HOW EACH OF THESE ITEMS OF EQUIPMENT IS STORED AND DISTRIBUTED (e.g., in each classroom, in media library in building, in centralized system library).

Film Projectors _____
Slide Projectors _____
Videotape Recorders _____
Videotape Players _____
Audio Tape Recorders _____
Record Players _____
Overhead Projectors _____
Television Receivers
  Black and White _____
  Color _____
Radios
  AM _____
  FM _____
CAI Terminals _____
Language Laboratories _____

(19) AUDIOVISUAL MATERIALS

	Type	Number	Age	Condition	Frequency of Use Per Classroom
Films					
Slides					
Videotapes					
Audiotapes					
Filmstrips					
CAI Programs					
Records					

notes

(20) HOW MUCH MONEY PER YEAR IS BUDGETED FOR THE PURCHASE OF AUDIOVISUAL MATERIAL? _____
FOR AUDIOVISUAL EQUIPMENT? _____

Items (21) to (25) identify situations which may help cable programming get off the ground.

(21) DOES BUILDING HAVE TELEVISION PRODUCTION AND/OR RECORDING FACILITIES? _____
IDENTIFY TYPE AND AMOUNT OF PRODUCTION EQUIPMENT.

_____

_____

_____

IDENTIFY TYPE AND AMOUNT OF RECORDING EQUIPMENT.

_____

_____

_____

IDENTIFY TYPE AND AMOUNT OF PLAYBACK EQUIPMENT.

_____

_____

_____

IDENTIFY PRODUCTION PERSONNEL.

_____

_____

_____

IDENTIFY TECHNICAL PERSONNEL.

_____

_____

_____

notes

(22) DOES BUILDING HAVE AUDIO PRODUCTION AND/OR RECORDING FACILITIES? _____

IDENTIFY TYPE AND AMOUNT OF PRODUCTION EQUIPMENT.

_____

_____

_____

IDENTIFY TYPE AND AMOUNT OF RECORDING EQUIPMENT.

_____

_____

_____

IDENTIFY TYPE AND AMOUNT OF PLAYBACK EQUIPMENT.

_____

_____

_____

IDENTIFY PRODUCTION PERSONNEL.

_____

_____

_____

IDENTIFY TECHNICAL PERSONNEL.

_____

_____

_____

notes

(23) DO ANY INDIVIDUALS CONNECTED WITH BUILDING (include administrators, teachers, students, parents and para-professionals) HAVE EXPERIENCE IN VIDEOTAPE PRODUCTION? _____

HOW MUCH AND WHAT TYPE? _____

_____

_____

_____

ARE THEY CAPABLE OF TRAINING OTHERS?

_____

_____

(24) ARE THERE INSTITUTIONS WITHIN TEN MILES OFFERING COURSES IN MEDIA OR COMMUNICATIONS THAT INCLUDE VIDEOTAPE PRODUCTION?

_____

_____

_____

CAN THE SCHOOL SYSTEM HELP SUBSIDIZE TRAINING?

_____

CAN THE SCHOOL SYSTEM ARRANGE FOR IN-SERVICE TRAINING OF PERSONNEL?

_____

(25) IF SCHOOL PROVIDES STUDENT TEACHING POSITIONS TO LOCAL COLLEGES, CAN COURSE VOUCHERS BE USED FOR PRODUCTION COURSES?

_____

WILL SYSTEM GRANT GRADUATE CREDIT FOR SAME?

_____

notes

CAN YOU IDENTIFY ANY TEACHERS WHO MIGHT WISH TO TAKE SUCH A COURSE?

Items (26) and (27) identify needs for educational access programming and channel time allocation.

(26) AT WHAT HOURS IS INSTRUCTIONAL TELEVISION MOST LIKELY TO BE USED?

TIME GRADE SUBJECT MATTER

(27) IDENTIFY PARTICULAR CURRICULAR, INFORMATIONAL OR COMMUNICATIONAL NEEDS THAT MIGHT BE MET BY LOCALLY PRODUCED PROGRAMMING.

notes

appendix I

Promulgated pursuant to G.L. c. 166A, s.16.

Publication #6684 (16-625-3-73 CR)
Approved by Alfred C. Holland, State Purchasing Agent

COMMONWEALTH OF MASSACHUSETTS COMMUNITY ANTENNA TELEVISION COMMISSION PROCEDURAL REGULATIONS FOR GRANTING COMMUNITY ANTENNA TELEVISION LICENSES

0.1. Definition — Initiative
As used in these regulations, initiative means any of the occurrences defined in paragraph 1.1 (a), (b), or (c) of these regulations.

0.2. Notice Requirements for Hearings
Except as otherwise or additionally required by these regulations, any public hearing held pursuant to these regulations shall require the publishing of notice for the same, sufficient to identify its time, place and purpose, in a newspaper of general circulation in the city or town once in each of two successive weeks, the first publication being not less than fourteen days before the day of any such hearing(s), or, if there is no such newspaper in such city or town, then by posting such notices in a conspicuous place in the city or town hall for a period not less than fourteen days before the day of such hearing(s).

Notice requirements established herein may be supplemented by any other means, including causing such notice, or a concise summary or description thereof, to be broadcast by means of radio or television facilities at such times, and with such frequency, as the issuing authority deems appropriate to serve the public interest.

0.3. Publishing Requirements for Applications
Except as otherwise or additionally required by these regulations, advertisements soliciting applications for a community antenna television license or licenses shall be published in a newspaper of general circulation in the city or town once in each of two successive weeks, the first publication being not less than sixty days before the filing deadline for receipt of applications, or, if there is no such newspaper in such city or town, then by posting such advertisements in a conspicuous place in the city or town hall for a period not less than sixty days before the filing deadline, for receipt of applications. Such advertisements shall also be published not less than sixty days before the filing deadline in at least three trade journals selected from a listing on file with the commission.

0.4. Certification of Receipt of Documents
An issuing authority shall certify receipt of the following:

(a) Each application and fee filed pursuant to paragraphs 1.1(b), 1.3(b) and 3.2 and;

(b) Each petition filed pursuant to paragraph 1.1(c) and;

(c) Each response filed pursuant to paragraph 3.2.

SECTION 1. INITIATION OF LICENSING PROCESS

1.0. A license granted after March 20, 1973 to construct and operate a community antenna television (cable) system shall be valid only when granted pursuant to these regulations.

1.1. Upon the occurrence of one or more of the following, the issuing authority shall initiate, as applicable, the procedures established herein, to determine whether the licensing process established herein shall be undertaken.

(a) A determination by the issuing authority, accompanied by a public announcement, that it will consider the granting of a cable license or licenses.

(b) The filing of a complete application on a form prescribed by the commission pursuant to Section 4 of Chapter 166A and of the fee required by Section 9 of Chapter 166A.

(c) The filing with the issuing authority of a petition by registered voters of the municipality, requesting the issuing authority to undertake the licensing process. A petition shall be valid when signed by a sufficient number of registered voters of the city or town over which the issuing authority has jurisdiction. That number shall be one-half of one per cent of the residents in the city or town, except that in no event shall the number of required signatures be more than 500 nor less than 10. The number of signatures necessary shall be determined from the last official federal census figure for the city or town.

1.2. Prior to a decision on any initiative(s), the issuing authority shall hold public hearing(s) to consider the desirability of undertaking the licensing process. (See paragraph 0.2.) The issuing authority shall insure that applicants and/or petitioners, if any, residents and other interested parties are afforded full and fair opportunity to be heard.

If more than one initiative occurs before the day of a hearing required by this paragraph, such additional initiative(s) shall be heard during the hearing(s) scheduled for the first such initiative.

Any initiative received following the hearing(s), but before a decision by the issuing authority is rendered, shall be considered to have been filed as of the first business day following such decision, unless withdrawn.

1.3. Within sixty days of any initiative, the issuing authority shall decide whether the licensing process shall be undertaken.

(a) If the issuing authority decides not to undertake the licensing process, it shall render with its decision, a written, public report specifying the reasons therefor. Within seven days of the decision date, it shall forward a copy of the decision and report to the commission. Such decision shall be considered a denial of any application(s). License applicants aggrieved by such a decision may appeal to the commission pursuant to Section 14 of Chapter 166A.

(b) If the issuing authority decides to initiate the licensing process, it shall:

(1) establish a cable advisory committee pursuant to paragraph 2.1 and;

(2) solicit applications for a cable license or licenses specifying a filing deadline for the same. (See paragraph 0.3.)

1.4. Following its decision to initiate the licensing process, the issuing authority shall approve or disapprove applications within the following periods from the date of its decision:

(a) Twelve months in a city or town of less than 50,000 residents or;

(b) Eighteen months in a city or town of 50,000 or more residents.

For the purposes of this paragraph, residents shall be determined from the last official federal census figure for the city or town.

1.5. As applications are received, they shall be made available for public inspection in the city or town clerk's office during regular business hours and for reproduction at a reasonable fee.

SECTION 2. ESTABLISHMENT OF CABLE ADVISORY COMMITTEE

2.1. When initiating the licensing process, the issuing authority shall establish a cable advisory committee. The issuing authority shall determine the formal organization of the committee and appoint its membership to reflect adequately the social, political, educational, cultural, and economic makeup of the community. Insofar as practical, the committee shall contain at least one member knowledgeable in the field of telecommunications.

2.2. The functions of the committee shall include:

(a) Informing and educating the public regarding cable communications to insure maximum public participation in the licensing process and;

(b) Preparing a general assessment of the cable needs of the community and;

(c) Preparing written policy recommendations on each checklist item listed in paragraph 2.3, and such other items as a majority of the committee deem appropriate.

The committee shall draft a report incorporating the recommendations prepared in accordance with subparagraphs (b) and (c) of this paragraph and summarizing the specific steps undertaken to comply with subparagraph (a). At least fourteen days before any hearing held pursuant to paragraph 3.1, copies of the completed committee report shall be transmitted to the issuing authority. Simultaneously, the report shall be made available for public inspection in the city or town clerk's office during regular business hours and for reproduction at a reasonable fee.

2.3. Pursuant to paragraph 2.2(c), the committee shall incorporate in its report written policy recommendations as to each of the following items and such other items as a majority of the committee deem appropriate.

(a) Area or areas to be served;

(b) Types and patterns of ownership and operation;

(c) Duration of the license;

(d) Construction schedule to include start and completion dates, rate of construction, problems incident to obtaining pole permits and street, way, duct and other rights necessary for construction;

(e) Capability of the distribution system including channel capacity, return capability and service potential to subregions of the proposed area(s) to be served;

(f) Plan for local origination capability including facilities, equipment, staffing and location of facilities;

(g) Criteria to be employed in assessing the character, financial, technical and other qualifications of applicants;

(h) Plan for municipal cooperation with prospective licensee(s) including the availability of municipal facilities and coordination of municipally-sponsored activity in such areas as education, libraries, public safety, and service delivery;

(i) Coordination with contiguous issuing authorities to investigate the sharing of fixed costs and/or the advisability of regionalization;

(j) Plan for local supervision of the cable operator to include complaint and compliance procedures;

(k) Plan for institution of equal employment opportunity practices;

(l) Customer contracts, rules, regulations and charges;

(m) Access channels and terminal equipment;

(n) Rights of privacy;

(o) Rights to information.

2.4. In the preparation of the report required by paragraph 2.2, the committee shall enable participation to the greatest practical extent by residents and other interested parties wishing to present information or suggestions for incorporation in its report.

In any event, residents and other interested parties may submit written material for consideration by the committee in its report. The committee shall make provision for independent reports to be attached, as addenda, to its own report, if requested to do so by any resident or other interested party. Reproduction costs of any independent report(s) shall be borne by those submitting the same.

SECTION 3. CABLE ADVISORY COMMITTEE REPORT HEARING(S)

3.1. The issuing authority shall hold public hearing(s) on the committee report and addenda, if any, at which all residents and other interested parties shall be permitted full and fair opportunity to be heard. (See paragraph 0.2.)

Notice of hearing(s) shall explicitly call attention to the availability of the committee report, and any addenda, for public inspection in the city or town clerk's office during regular business hours and for reproduction at a reasonable fee.

Following such hearing(s), the issuing authority shall render a report taking into account the report of the committee, any addenda thereto, and testimony elicited during public hearing(s). The issuing authority report shall include policy guidelines with respect to each item of paragraph 2.3, and such others as it deems appropriate.

3.2. Within three business days of the rendering of its report, the issuing authority shall publish or post notice that its report is available for public inspection in the city or town clerk's office during regular business hours and for reproduction at a reasonable fee. The publishing or posting requirement in this paragraph shall be met by publishing notice of the availability of said report in a newspaper of general circulation in the city or town, or if there is no such newspaper in such city or town, then by posting notice of the same in a conspicuous place in the city or town hall.

Within seven days following the rendering of its report, the issuing authority shall:

(a) Forward a copy of its report to each applicant of record, inviting such applicant(s) to submit sealed responses to said report. Responses may include amendments and/or revisions to application(s) previously filed and;

(b) Solicit additional applications which shall be sealed when filed. Advertisements shall explicitly state that the issuing authority report is available on request; and (See paragraph 0.3.)

(c) Set a simultaneous filing deadline for the receipt of responses and new applications.

Sealed responses and new applications shall not be opened before the first business day following the filing deadline established pursuant to this paragraph. On that day, responses and applications shall be opened, and, thereafter, copies made available for public inspection in the city or town clerk's office during regular business hours and for reproduction at a reasonable fee.

SECTION 4. FORMAL LICENSING PROCEDURE

4.1. Within a reasonable time following the filing deadline established for applicant responses and new applications as prescribed by paragraph 3.2, the issuing authority shall hold public hearing(s) to assess the qualifications of each applicant. (See paragraph 0.2.) Assessment of applicant qualifications shall be limited to the information provided in applications filed pursuant to paragraphs 1.1(b), 1.3(b), or 3.2, applicant responses filed pursuant to paragraph 3.2, the issuing authority report rendered pursuant to paragraph 3.1, and oral testimony, if any, elicited during hearing(s) established by this paragraph.

Notice of hearing(s) shall explicitly call attention to the availability of the issuing authority report, applicant responses and new applications for public inspection in the city or town clerk's office during regular business hours and for reproduction at a reasonable fee.

The issuing authority shall make provision for a stenographic or tape record of hearing(s) conducted pursuant to this paragraph. The cost of such record shall be borne in equal shares by all applicants. The issuing authority shall insure that all applicants, residents and other interested parties are afforded full and fair opportunity to be heard.

4.2. The issuing authority shall, within a reasonable time following the close of hearing(s) conducted pursuant to paragraph 4.1, and, in any event, within the period prescribed by paragraph 1.4, simultaneously approve or disapprove each applicant. License applicants aggrieved by a denial by the issuing authority may appeal to the commission pursuant to Section 14 of Chapter 166A.

Concurrent with approval, the issuing authority shall grant a provisional license to each approved applicant.

4.3. Concurrent with granting a provisional license or licenses, the issuing authority shall set a final date by which the requirements set forth in paragraph 5.1 must be met. Any provisional license(s) granted pursuant to paragraph 4.2 shall expire upon the issuance of a final license(s), or upon the failure of the provisional licensee(s) to comply with the requirements of paragraph 5.1 within the time allowed. In the event the issuing authority finds that there has been such a failure to comply, the issuing authority shall issue a written statement setting forth in detail the basis of said finding, and shall, simultaneously, cause a copy of such statement to be transmitted to the provisional licensee(s) and to the commission by registered mail, return receipt requested.

4.4. Within thirty days of the issuance of a statement of non-compliance under paragraph 4.3, the holder of the expired provisional license may appeal to the commission.

4.5. Upon expiration of the appeal period provided by paragraph 4.4, or upon a decision by the commission sustaining the finding of the issuing authority the issuing authority may designate another provisional licensee(s) from among those applicants previously rejected, or may determine to re-commence the licensing procedure pursuant to paragraph 1.3(b).

4.6. Concurrent with the grant of any provisional license(s) and/or the rejection of any or all applicants, the issuing authority shall, in accordance with Section 6 of Chapter 166A, issue a written public statement of the basis for its decision. This statement shall set forth in detail the reasons for the selection of each successful applicant and the rejection of all other applicants, including an evaluation of the qualifications of each applicant with respect to the policy guidelines established by the issuing authority pursuant to paragraph 3.1. This statement shall be made available for public inspection in the city or town clerk's office during regular business hours and for reproduction at a reasonable fee.

4.7. No provisional license or any rights thereunder shall be transferred, assigned or disposed of in any manner, voluntarily or involuntarily, directly or indirectly, or by transfer of control of any entity holding such provisional license, to any person or entity, except as hereinafter provided.

For the purposes of this paragraph, transfer of control of any entity holding such provisional license shall include but not be limited to:

(a) Any instance where an individual stockholder gains or loses affirmative or negative (50%) control. (Affirmative control consists of control of more than 50% of voting stock; negative control consists of control of exactly 50% of voting stock.)

(b) Any instance where any family group or any individual in a family group gains or loses affirmative or negative (50%) control.

(c) Any instance where any group in privity gains or loses affirmative or negative (50%) control.

(d) Notwithstanding the prima facie instances of transfer of control in this paragraph, transfer of control of a provisional license shall exist when any or all of the following occur:

(1) a provisional licensee relinquishes sole responsibility for the operation and control of the development of the cable system for which a provisional license has been granted;

(2) a provisional licensee relinquishes sole responsibility to determine and carry out policy decisions;

(3) a provisional licensee relinquishes sole discretion to control employment, supervision and dismissal of personnel;

(4) a provisional licensee relinquishes sole responsibility for payment of financial obligations related to the cable system for which a provisional license has been granted.

Notwithstanding any provision(s) of this paragraph, a provisional license or any rights thereunder may be transferred or assigned with prior issuing authority approval in the event of the death or

disability of a principal of an entity holding a provisional license. No such transfer or assignment shall be effected however, unless an affirmative factual showing, supported by affidavits of a person or persons with personal knowledge thereof, establishes that such death or disability so affects the entity possessing a provisional license that such transfer or assignment is necessary and in the public interest.

An issuing authority shall not consent to the transfer or assignment of control of the provisional license if the agreements or understandings between the parties provide for, or permit, payment to the assignor or transferor of a sum in excess of the aggregate amount clearly shown to have been legitimately and prudently expended, and to be expended by the assignor or transferor solely for preparing, filing, and advocating the grant of the provisional license for the cable system, and for other steps reasonably necessary toward placing the cable system in operation.

SECTION 5. GRANT OF FINAL LICENSES

5.1. A final license to construct and operate a cable system shall be granted by the issuing authority following substantial compliance by a provisional licensee with each of the following requirements:

(a) Submission of proof of capacity to comply with the terms required to be included in the final license under Section 5 of Chapter 166A;

(b) Sumission of proof of capacity to comply with the terms required to be included in the final license under subparagraph 5.3(b) of these regulations;

(c) Submission of proof of adequate financial resources to construct and operate the cable system including a summary of any and all financing arrangements entered into by the provisional licensee involving said cable system. Submission of detailed financial projections for all capital and operating expenses for the first ten years of system operation. In the event a provisional licensee submits financial projections to any prospective lender and/or investor, said licensee shall submit a copy of the same to the issuing authority.

(d) Submission of proof of execution of all contracts, equipment leases and/or purchases necessary for system construction including a summary setting forth the specific financial terms and conditions of each contract, lease or purchase entered into including but not limited to any liens or similar interests created thereby;

(e) Filing executed copies of all pole attachment, duct and right of way agreements necessary for system construction;

(f) Completion of detailed strand maps of the area(s) to be served;

(g) Submission of completed rate schedules in compliance with the schedules filed in a provisional licensee's application pursuant to paragraph 3.2 including:

(1) Installation charge;

(2) Installation charge for additional hook-ups in the same residence;

(3) Basic monthly subscriber charge;

(4) Monthly charge for each additional television hook-up;

(5) Access channel charges;

(6) Terminal charges;

(7) Special rates, if any, for (1)-(6) above;

(8) Any other rates.

(h) Submission of a detailed plan to assure non-discriminatory and orderly use of access channels;

(i) Submission of a completed copy of system extension policy and rates, in compliance with the extension plan and rates filed in the provisional licensee's application pursuant to paragraph 3.2;

(j) Submission of proof that engineering and technical standards, as proposed by the applicant and/or required by the issuing authority, will be met;

(k) Submission of proof that the head-end site(s) is available;

(l) Submission of proof of capacity to provide local origination facilities, equipment and technical assistance in compliance with the terms in the provisional licensee's application pursuant to paragraph 3.2;

(m) Submission of proof of capacity to provide programming services in compliance with the services delineated in the provisional licensee's application pursuant to paragraph 3.2;

(n) Submission of proof that application for a certificate of compliance from the Federal Communications Commission

had been filed within thirty days of the grant of a provisional license;

(o) Submission of a detailed plan, and proof of capacity to implement the equal opportunity employment program for the operation of the cable system as delineated in the provisional licensee's application pursuant to paragraph 3.2;

(p) Certification by a provisional licensee that any and all contracts, agreements and understandings, formal or informal, entered into by said licensee regarding the cable system, have been disclosed to the issuing authority in a written summary. A copy of the disclosure and of each such contract, agreement and understanding shall be filed in the city or town clerk's office and made available for public inspection during regular business hours.

5.2. Upon the determination by the issuing authority, or upon the written request by a provisional licensee to the issuing authority, public hearing(s) shall be convened during the compliance period established pursuant to paragraph 4.3 for the purpose of informing the public on any matter(s) related to the compliance requirements established pursuant to paragraph 5.1. (See paragraph 0.2.) The issuing authority shall insure that provisional licensee(s) and any resident or other interested parties are afforded full and fair opportunity to be heard.

5.3. A final license shall contain:

(a) Terms that, at a minimum, are in compliance with the statutory requirements of Section 5 of Chapter 166A, and;

(b) Terms substantially identical with the terms of the offer made by the provisional licensee in its application pursuant to paragraph 3.2. Notwithstanding the foregoing, a final license may contain terms differing from those offered in the application, if the issuing authority, in conjunction with the public statement required by paragraph 5.4 sets forth a detailed statement in writing of its reasons for accepting an alteration of those terms.

5.4. Concurrent with the grant of a final license, the issuing authority shall issue a public statement in writing reporting the license grant. The statement shall certify that the licensee has complied with the requirements of paragraph 5.1, and that the terms of the license are in compliance with paragraph 5.3. Where applicable, the statement shall contain the statement referred to in subparagraph 5.3(b).

5.5. Copies of the final license and of the statement required by paragraph 5.4 shall be made available for public inspection in the city or town clerk's office during regular business hours and for reproduction at a reasonable fee.

5.6. The issuing authority shall notify the commission of any provisional or final license grant within seven days of any award. The notification requirement shall be met by submission of the following documents where applicable:

(a) Upon the grant of a provisional license:

(1) one copy of all applications and responses submitted pursuant to paragraphs 1.1(b), 1.3(b), or 3.2;

(2) one copy of the cable advisory committee report with addenda;

(3) one copy of the issuing authority report;

(4) one copy of the written statement required by paragraph 4.6;

(5) a stenographic or tape record of the hearing(s) conducted pursuant to paragraph 4.1.

(b) Upon the grant of a final license:

(1) one copy of the final license agreement;

(2) one copy of the written statement pursuant to paragraph 5.4;

(3) one copy of all documents filed pursuant to paragraph 5.1.

appendix 2

MASSACHUSETTS TELEVISION MARKETS

It is particularly important for educators to know what market their community is in because different rules apply to cable systems in major metropolitan areas (top-100) than in smaller markets. Specifically, the requirement to provide an educational access channel is dependent on a community being part of a top-100 market.

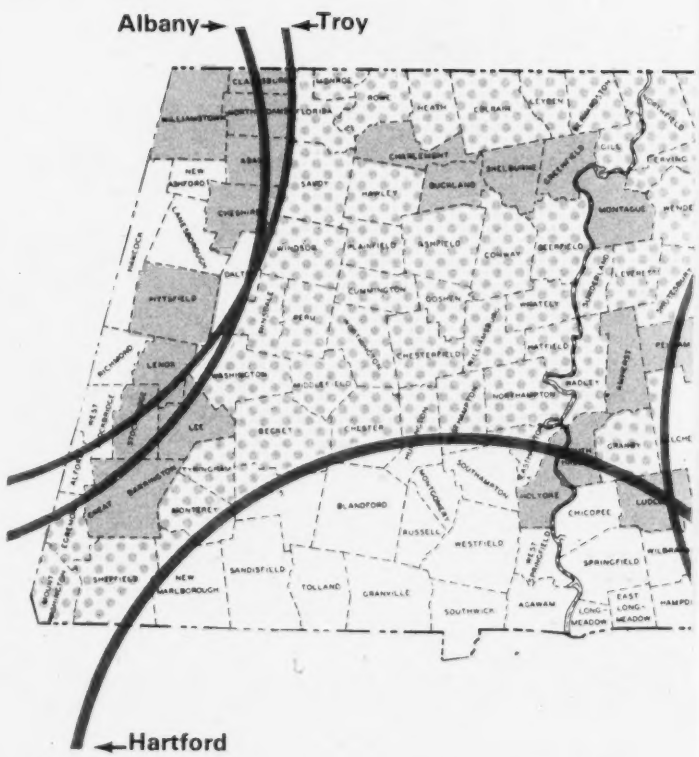
A major market (or top-100) is defined as all the area within 35 miles of the center of a community having a licensed TV broadcast station. Major market areas affecting Massachusetts are outlined by circles on the map. These are:

#6 – Boston/Cambridge/Worcester, Massachusetts
#9 – Hartford/New Haven/New Britain/ Waterbury, Connecticut
#33 – Providence, Rhode Island/New Bedford, Massachusetts
#34 – Albany/Schenectady/Troy, New York

The 35 mile radius circles place all of the Commonwealth in top-100 markets except Nantucket and parts of Barnstable, Berkshire, Franklin, Hampden and Hampshire counties. Many towns in these areas do not fall clearly into either category because:

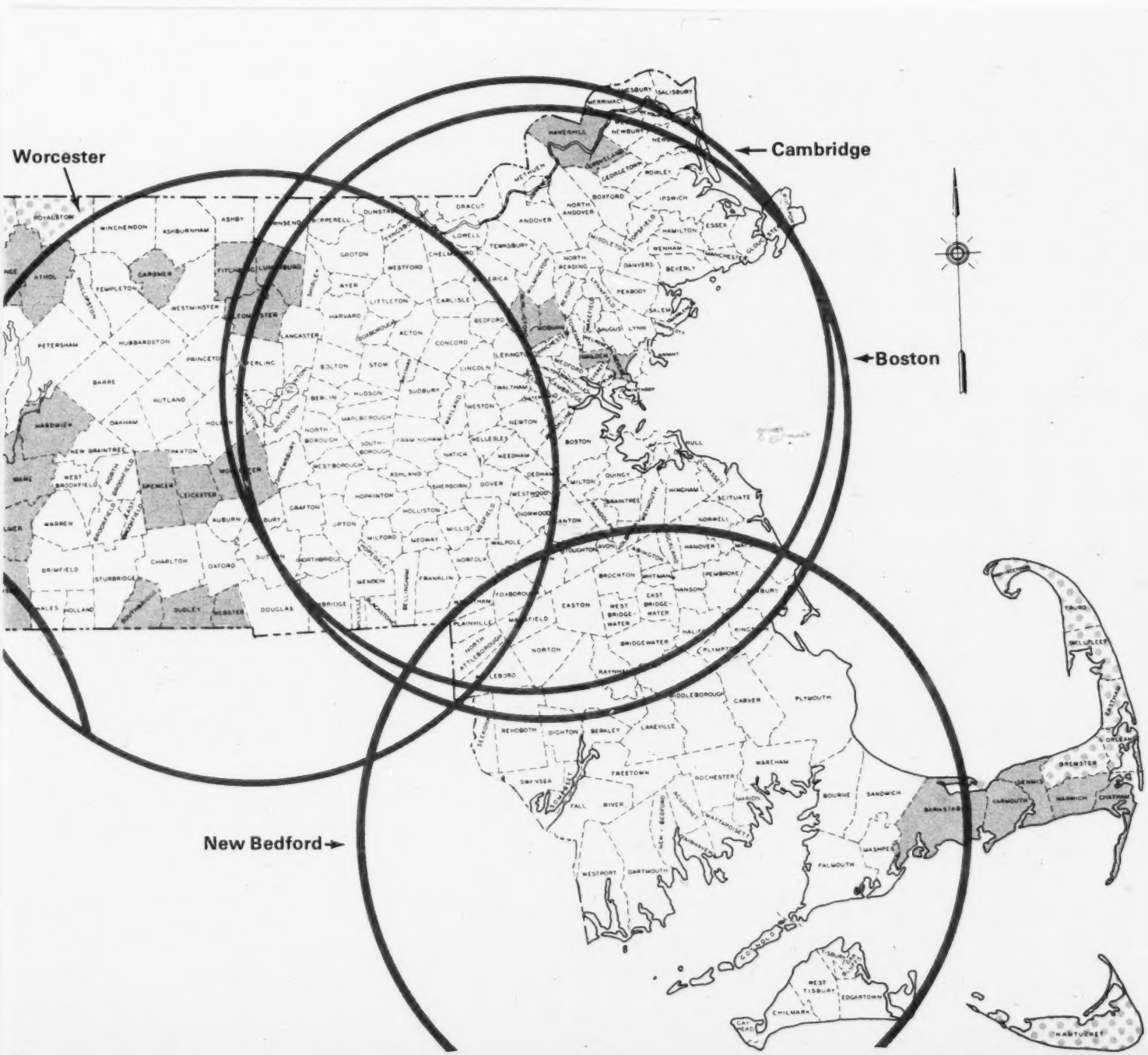
- maps and FCC regulations are not precise enough for accurate definition of municipal boundaries;
- grandfathered systems (shown on map) do not have to comply with the FCC rules until 1) their present contracts expire or 2) 1977, whichever shall occur first;
- one or more towns within a region on the periphery of the circles might fall in a top-100 market, the others in the smaller market, e.g., Lenox. In such cases, the FCC requires cable systems "to operate in accordance with the rules governing the larger market."

In short, within the top-100 areas, there is no confusion. In the peripheral areas, towns should seek specific definition from regulatory bodies (FCC and Massachusetts CATV Commission) before signing a franchise. Then, bearing in mind that exceptions can be made with permission from the FCC, work out the best arrangement possible with the local cable operator — clearly specifying in the franchise exactly what rules the system will operate under and what services will be provided.



Operating on or before March 31, 1972

Outside top 100 market


Worcester
Cambridge
Boston
New Bedford

appendix 3

INSTITUTIONS WITH TV STUDIO FACILITIES

This list is reproduced with permission from *Strengthening the Alternative Postsecondary Education System: Continuing and Part-Time Study in Massachusetts,* Nolfi, G., Nelson, V., *et al.,* University Consultants, Inc., Cambridge, Massachusetts, 1973, a study produced for the Massachusetts Advisory Council on Education.

AMHERST-NORTHAMPTON AREA
Amherst College
Greenfield Community College
Hampshire College
Smith College
University of Massachusetts, Amherst

ANDOVER-LOWELL AREA
Lowell State College
Lowell Technological Institute
Northern Essex Community College

BOSTON AREA
Babson College
Bentley College
Blue Hills Regional Technical School
Boston College
Boston State College
Boston University
- School of Public Communications
- School of Nursing
- School of Education

Brandeis University
Career Academy
Curry College
Eastern Nazarene College
Emerson College
Grahm Junior College
Harvard University
Massachusetts Bay Community College
Massachusetts College of Art
Massachusetts College of Optometry
Massachusetts College of Pharmacy
Massachusetts Institute of Technology
Massachusetts Radio and Electronics School
Mount Ida Junior College
New England Conservatory of Music
Newbury Junior College
Newton College
Northeast Broadcasting School
Northeastern University

BOSTON AREA, continued
Pine Manor Junior College
Regis College
Rets Electronics School
Simmons College
Suffolk University
Tufts University
Wellesley College
Wentworth Institute
Wheelock College

BROCKTON AREA
Bridgewater State College
Massasoit Community College
Stonehill College

BURLINGTON-BEDFORD AREA
Middlesex Community College

FALL RIVER AREA
Bristol Community College
Southeastern Massachusetts University
Swain School of Design

FALMOUTH-BARNSTABLE AREA
Cape Cod Community College
Massachusetts Maritime Academy

FITCHBURG AREA
Fitchburg State College
Mount Wachusett Community College

FRAMINGHAM AREA
Framingham State College

LYNN-SALEM AREA
Endicott Junior College
Gordon College
North Shore Community College
Salem State College

PITTSFIELD-NORTH ADAMS AREA
Berkshire Christian College
Berkshire Community College
Williams College

SPRINGFIELD AREA
American International College
Bay Path Junior College
College of Our Lady of the Elms
Holyoke Community College
Mount Holyoke College
Springfield Technical Community College
Western New England College
Westfield State College

WORCESTER AREA
Anna Maria College for Women
Assumption College
Central New England College
Clark University
College of the Holy Cross
Leicester Junior College
Quinsigamond Community College
Worcester Polytechnic Institute
Worcester State College

appendix 4

POTENTIAL SOURCES OF FEDERAL FUNDING FOR EDUCATIONAL TECHNOLOGY PROJECTS

Changes in the U.S. Office of Education following the establishment of the National Institute for Education (NIE) in the fall of 1972 should be noted by any educators interested in grants. The Office of Educational Technology (OE) will continue to adminster the Educational Broadcasting Facilities Program; *Sesame Street* and *The Electric Company*; the non-developmental, non-experimental aspects of The Emergency School Aid Act television grants, and the monitoring of all Title III-ESEA technology projects including training and support of educational facilities activities.

The Task Force on Educational Technology and Productivity in the NIE will handle the majority of technology demonstration projects pertaining to satellites, open-learning systems, **cable television**, productivity, ESAA-TV experimental/developmental projects and major new initiatives in research, planning and evaluation of technology activities.

The following list of potential funding sources for educational technology is not all-inclusive. Other Federal programs can offer support provided the proposal is addressed to the basic goals of a given program. Guidelines should be obtained before forwarding drafts or formal proposals to listed programs because funding levels are not yet fixed and each program has specific legislative constraints.

POTENTIAL FEDERAL SOURCES OF FUNDS FOR EDUCATIONAL TECHNOLOGY PROJECTS IN FY'74

PROGRAMS OE/NIE	WHO MAY APPLY	WHERE TO APPLY AND INITIAL CONTACT
Adult Education — Special Projects By legislative mandate this program is targeted to adult literacy projects including the area of English as a second language. Program emphasis is on experimentation with new teaching approaches, techniques and operational systems.	Local education agencies and other public or private, non-profit agencies including educational television stations	Director, Division of Adult Education Program, Bureau of Occupational and Adult Education U.S. Office of Education Washington, D.C. 20202 Telephone (202) 963-7444
Educational Broadcasting Facilities Grants to acquire and install electronic equipment for non-commercial educational radio and television stations.	Tax supported universities, public school systems, state ETV/ER agencies, municipalities, and also non-profit organizations primarily organized for broadcasting	Office of Public Information National Institute of Education Code 600 Washington, D.C. 20202 Telephone (202) 755-3507
Educational Research NIE's purpose is to further equality of educational opportunity and improve the quality of education using the following approaches: solving educational problems; advancing the practice of education; strengthening its scientific and technological base; establishing an effective research and development system. Three programs within NIE are contained in this listing, Emergency School Aid-Educational Television, Research Grants and Technology Demonstrations. Other programs will be announced in the future.	Public and private, profit and non-profit organizations, institutions, agencies and individuals	Director, Educational Broadcasting Facilities Program U.S. Office of Education Washington, D.C. 20202 Telephone (202) 755-7727

PROGRAM OE/NIE	WHO MAY APPLY	WHERE TO APPLY AND INITIAL CONTACT
Technology Demonstrations To develop and demonstrate projects which hold promise of making a substantial technological contribution to the solution of critical educational problems. Research and evaluation are integral parts of each effort in order to document effectiveness.	Colleges, universities, public and non-public agencies, profit and non-profit organizations and school systems	Educational Technology and Productivity Task Force National Institute of Education Code 600 Washington, D.C. 20202 Telephone (202) 755-7490
Emergency School Aid — Educational Television (under aegis of ASE) To assist in the process of eliminating, re fucing and/or preventing the educational isolation of minority groups through the effective use of television programming. The programming must have positive cognitive and affective value and present multi ethnic children's activities.	Public and non-profit private organizations	Educational Technology and Productivity Task Force National Institute of Education Code 600 Washington, D.C. 20202 Telephone (202) 755-7650
Research Grants (formerly Field Initiated Studies) A continuing program of the National Institute of Education, the program in the past has emphasized specific disciplines but is open to soundly designed research proposals involving technology.	Local and state education agencies, institutions of higher learning, profit and non-profit organizations	Office of Research Grants National Institute of Education Code 600 Washington, D.C. 20202 Telephone (202) 755-7940
Fund for the Improvement of Postsecondary Education To improve the effectiveness and quality of post-secondary education. Emphasis is on diversity and cost effectiveness within five broad areas; new approaches to teaching and learning; implementing equal educational opportunity; revitalizing institutional missions; new educational missions; encouraging an open learning system.	All postsecondary institutions and agencies	Director, Fund for Postsecondary Education Office of the Assistant Secretary for Education Washington, D.C. 20202 Telephone (202) 962-3811
Handicapped — Research and Demonstration Research and demonstration projects aimed at improving the education of handicapped children. Projects, may involve the use of computers, television, tape recorders etc. in the research and/or development of instructional systems and materials.	State, local, public and private agencies and institutions as well as research organizations	Director, Division of Research Bureau of Education for the Handicapped U.S. Office of Education Washington, D.C. 20202 Telephone (202) 962-1142
Handicapped Early Childhood Assistance Grants to demonstrate exemplary services to handicapped children through early education years, they are to include evaluation, dissemination and parent participation. As a service program it emphasizes realistic, practical approaches.	Public agencies and private non-profit organizations	Program Coordinator Handicapped Children's Early Education Assistance Division of Educational Services U.S. Office of Education Washington, D.C. 20202 Telephone (202) 963-7101

PROGRAMS OE/NIE	WHO MAY APPLY	WHERE TO APPLY AND INITIAL CONTACT
Handicapped Media Services and Captioned Film Funds for providing captioned film and media for the deaf. May support contract for research in use of films and other media for the handicapped. This program has the closest relationship with technology of the three programs cited in the handicapped category.	State and local agencies, public and non-profit institutions of higher education	Chief, Media Services and Captioned Films Branch U.S. Office of Education Washington, D.C. 20202 Telephone (202) 963-5230
Right to Read To increase functional literacy so that by 1980, 99% of those 16 years of age and 90% of those over 16 will be functionally literate. Stressed are the planning and implementing of exemplary programs as well as dissemination of information on effective reading and teacher training practices.	Public or non-public schools, colleges and universities, and and community agencies	National Right to Read U.S. Office of Education Washington, D.C. 20202 Telephone (202) 963-3456
Teacher Corps — Operations and Training To strengthen education opportunities for children in low income areas and encourage higher education institutions to broaden teacher preparation programs. Some funding may exist in the area of developing self-paced, competency-based teacher training materials.	Accredited colleges and universities with state approved degree programs. Local/education agencies may apply under certain circumstances. Private schools may not be prime contractors	Director, Teacher Corps U.S. Office of Education Washington, D.C. 20202 Telephone (202) 755-7400
Vocational Education — Curriculum Development To assist state and local education agencies in the development of curriculums for new and changing occupations. It is also aimed at the coordination of improvements and dissemination of existing material. By legislative mandate this program deals with occupations requiring less than a bachelor's degree.	State and local education agencies as well as colleges, universities and profit and non-profit groups	Director, Division of Vocational Education Research Bureau of Occupational and Adult Education U.S. Office of Education Washington, D.C. 20202 Telephone (202) 962-5696
Vocational Education — Research Designed to meet the special vocational needs of youth, the program sponsors research, training, experimental, developmental or pilot projects and the dissemination of results from them. By legislative mandate this program deals with occupations requiring less than a bachelor's degree.	State and local education agencies, public and private agencies, colleges and universities	Director, Division of Vocational Educational Research Bureau of Occupational and Adult Education U.S. Office of Education Washington, D.C. 20202 Telephone (202) 962-0186

OTHER GOVERNMENT PROGRAMS	WHO MAY APPLY	WHERE TO APPLY AND INITIAL CONTACT
Health Services Research and Development To establish, improve or expand programs designed to provide the highest level of health services possible, both in quality and equality of access. The program supports research, development, testing and evaluation projects designed to achieve the above objectives.	Non-profit institutions such as universities and other public or non-profit agencies, institutions and organizations	Director, National Center for Health Services Research and Development Health Services and Mental Health Administration 5600 Fishers Lane Rockville, Maryland 20852 Telephone (301) 443-2800
Manpower Research To conduct a program of experimental, developmental, demonstration, and pilot projects for the purpose of improving techniques and demonstrating the effectiveness of specialized methods in meeting the manpower, employment and training problems of worker groups.	Academic institutions, state and local government units, community and private groups	Director, Office of Research and Development Manpower Administration U.S. Department of Labor Washington, D.C. 20210 Telephone (202) 961-4107
National Science Foundation, Educational Directorate The National Science Foundation's charter is to encourage science and science education, not educational research, per se. The Foundation does fund efforts involving instructional technology in science education.	Colleges, universities, consortia of such institutions and non-profit research institutions	National Science Foundation Education Directorate Washington, D.C. 20550 Telephone (202) 282-7920

glossary

A/B Switch A mechanism for converting each channel on a standard television set into two cable channels, e.g., 2A and 2B

Bandwidth The difference, measured in cycles per second or Hertz (Hz), between the lowest and highest frequencies that can be carried by a telecommunications system. Cable systems occupy bandwidths up to 250 MHz (Megahertz), usually from 50 to 300 MHz.

CATV, CTV, CABLE TV A communication system which distributes broadcast signals and locally produced programming services on a coaxial cable. Originally called Community Antenna Television (CATV), the more appropriate term CTV (for cable television) includes expanded cable uses.

Cablecasting All programming other than broadcast signals.

CARS (Community Antenna Relay Service) The microwave frequency band assigned by the Federal Communications Commission to the CTV industry for relaying television signals.

Certificate of Compliance The approval of the Federal Communications Commission (FCC) that a cable system must obtain before it can carry broadcast TV signals.

Chapter 166A The section of the Massachusetts General Laws which established state jurisdiction over cable and created the Massachusetts Community Antenna Television Commission to regulate CTV activities within the Commonwealth.

Closed Circuit Television (CCTV) A system for transmitting audiovisual signals with receiving and originating equipment linked directly by cable, microwave or telephone lines.

Communications Satellites Satellites in space equipped to receive and transmit signals to and from the earth.

Converter A device which converts nonstandard VHF television signals into standard VHF channels, necessary when the cable system distributes more than twelve channels on a single cable.

Downstream Signals travelling from the head end to subscriber receivers.

Drop The coaxial cable that connects a building to the nearest feeder line of the cable network.

Educational Access Channel FCC rules require cable operators in top-100 markets to reserve one channel for educational uses, free for "a developmental period."

Federal Communications Commission (FCC) The Federal agency authorized to regulate electronic communications, including CTV.

Film Chain A device for showing sound, motion pictures and slides on television.

Franchise The contract between a CTV operator and the Issuing Authority defining the conditions under which an operator can install and operate a cable system. Under federal regulations, a franchise, or any other agreement, amounts to a license to operate.

Franchise Fee The fee paid annually by a cable operator to the Issuing Authority, limited by the FCC to three to five per cent of the gross subscriber revenues.

Government Access Channel FCC rules require cable operators in top 100 markets to reserve one channel for government use, free for "a developmental period."

Grandfathering Exempting cable systems from Federal rules because they existed, were operating or had made substantial investments in system construction before the rules were passed. Grandfathering applies to signal carriage, access channels and the certification process.

Gross Subscriber Revenues The total number of subscribers multiplied by the total monthly fees they pay.

Hardware The equipment involved in producing, storing, distributing or receiving electronic signals. With CTV this includes the head end, the coaxial cable network, amplifiers, TV receiver and production equipment (cameras, videotape recorders etc.).

Head End The electronic control center of a CTV system,

usually located at the antenna site. Head end equipment amplifies, filters and converts incoming broadcast TV signals for distribution over a cable system.

Interconnection Linking CTV head ends so that subscribers to different cable systems can see the same program simultaneously.

Interference Energy which tends to interfere with the reception of desired signals.

ITFS Instructional Television Fixed Service. The transmission by an educational group of audiovisual information on FCC assigned frequencies to one or more fixed locations.

Leapfrogging CTV operators' practice of skipping over one or more of the nearest TV stations to bring in a farther signal for more program diversity on cable. FCC rules now control this.

Leased Channels In addition to the designated access channels and over-the-air broadcast channels, cable systems must make the remainder of their channels available for lease to groups or individuals at posted rates.

Local Origination Channel A channel on a cable system programmed by the cable operator.

Massachusetts Community Antenna Television Commission The agency empowered by Chapter 166A of the General Laws to regulate CTV activities within the Commonwealth.

Megahertz One Megahertz (MHz) = 1,000,000 Hertz (Hz). A Hertz is a measure of frequency. One Hertz = one cycle per second.

Off-the-air Reception of a TV signal that has been broadcast through the air.

Penetration (or Participation) The ratio of the number of subscribers to the total number of households passed by the cable distribution system.

Public Access To insure that diverse community opinion is aired on CTV, FCC rules require systems in the top-100 markets to reserve one public access channel to be free and always available on a first come, first served basis for noncommercial use by the public.

Software Programming and programming materials such as films, videotapes and slides.

Terminal The connectors, transformers and converter (if necessary) on a cable subscriber's television set.

Top-100 Market Ranking of the largest TV broadcast areas in the U.S. by size of market, i.e., the number of viewers and TV households. Used as a basis for FCC regulations and in selling air time to advertisers.

Trunk Line The major distribution cable used in CTV. It divides into feeder lines which are tapped for service to subscribers.

Two-way A CTV system with two-way capacity can conduct signals to the head end as well as away from it. Two-way, interactive or bi-directional systems now carry data. They may eventually carry full audio and video TV signals in both directions.

Upstream Signals travelling from subscribers to the head end, as in two-way.

UHF Ultra high frequencies. The range of frequencies from 300 to 3,000 Megahertz. TV channels 14 through 83 are in the UHF band.

VHF Very high frequencies. The range of frequencies extending 30 to 300 Megahertz. TV channels 2 through 13 are in the VHF band.

Video The visual components of a TV signal.

Videotape Used to electronically record sight and sound for instant playback, videotape comes in ¼", ½", ¾", 1" and 2" widths and can be erased and re-recorded.

VTR Abbreviation for videotape recorder, a device which records and plays back magnetically taped sound and picture recordings.

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A. GENERAL SOURCES

CABLE TELEVISION INFORMATION CENTER
The Urban Institute
2100 M Street, N.W.
Washington, D.C. 20037

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
OFFICE OF EDUCATION
National Center for Educational Technology
Washington, D.C. 20202

FEDERAL COMMUNICATIONS COMMISSION
1919 M Street, N.W.
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C. INSTRUCTIONAL TELEVISION (ITV) PROGRAMMING SOURCES

Catalogs and schedules of tapes, films, curricula and programs for sale or lease are available from the following sources.

MASSACHUSETTS EXECUTIVE COMMITTEE FOR EDUCATIONAL TELEVISION
The 21 Inch Classroom
55A Chapel Street
Newton, Massachusetts 02160

EASTERN EDUCATIONAL NETWORK
381 Elliot Street
Newton Upper Falls, Massachusetts 02164

GREAT PLAINS NATIONAL INSTRUCTIONAL TELEVISION LIBRARY
P.O. Box 80669
Lincoln, Nebraska 68501

NATIONAL INSTRUCTIONAL TELEVISION CENTER
Box A
Bloomington, Indiana 47401

UNITED STATES GOVERNMENT, NATIONAL AUDIOVISUAL CENTER
General Services Administration
National Archives and Record Service
Washington, D.C.

(Publication 72-17, 1971 Supplement)

current MACE publications

1973	
Essentially Elementary Science	Dean K. Whitla
Strengthening the Alternative Post-secondary Education System: Continuing and Part-Time Study in Massachusetts	George Nolfi University Consultants
Higher Education in Massachusetts: A New Look at Some Major Policy Issues	Academy for Educational Development
1972	
Modernizing School Governance for Educational Equality and Diversity	Paul W. Cook, Jr.
Massachusetts Schools: Past, Present and Possible	Richard H. deLone
Child Care in Massachusetts: The Public Responsibility	Richard Rowe
1971	
Massachusetts Study of Educational Opportunities for Handicapped and Disadvantaged Children	Burton Blatt Frank Garfunkel
Organizing for a Child's Learning Experience: A Report of a Study of School District Organization in Massachusetts	Donald T. Donley
Quality Education for the High Schools in Massachusetts: A Study of the Comprehensive High School in Massachusetts	Lloyd S. Michael
The People's Colleges: The State Colleges of Massachusetts	Evan R. Collins et al.
A Systems Approach for Massachusetts Schools: A Study of School Building Costs	Nelson Aldrich George Collins Charles F. Mahoney
1970	
Organizing an Urban School System for Diversity	Joseph M. Cronin
The Massachusetts Department of Education: Proposals for Progress in the 70's	John S. Gibson
Compensatory Education in Massachusetts: An Evaluation with Recommendations	Daniel Jordan Kathryn H. Spiess
Continuing Education in Massachusetts: State Programs for the Seventies	Melvin Levin Joseph Slavet
The State Dollar and the Schools: A Discussion of State Aid Programs in Massachusetts and Promising Reforms	Charlotte Ryan
Report of the Massachusetts Business Task Force for School Management	Warren King and Associates
1969	
A Cost Benefit Analysis of General Purpose State School Aid Formulas in Massachusetts	Andre Daniere
The Measurement of Alternative Costs of Educating Catholic Children in Public Schools	Andre Daniere George Madaus
Guidelines for Planning and Constructing Community Colleges	Bruce Dunsmore
Take a Giant Step: Evaluation of Selected Aspects of Project 750	Herbert Hoffman
Pupil Services for Massachusetts Schools	Gordon Liddle Arthur Kroll
1968	
The Management of Educational Information	Information Management, Inc.
Occupational Education for Massachusetts	Carl Schaefer Jacob Kaufman
Teacher Certification and Preparation in Massachusetts	Lindley J. Stiles
1967	
The Massachusetts System of Higher Education in Transition	Samuel Gove
Inequalities of Educational Opportunity in Massachusetts	New England School Development Council